Publication of the Centre of
Advanced study in Sanskrit
Class B No. 12

Zero in Pāṇini

by

M. D. Pandit

Centre of Advanced Study in Sanskrit,
University of Poona.
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To
The Sacred Memory
of my mother,
Śrīmatī Saubhāgyavatī
Lakṣmībāi Pandit.

FOREWORD

It gives me great pleasure in placing before the world of scholars interested in Pāṇinian studies this monograph entitled "Zero in Pāṇini" (CASS Publication, Class B, No. 12) by Dr. M. D. Pandit of the Department of Sanskrit & Prakrit Languages, University of Poona.

Pāṇini, the greatest theorist of Sanskrit Grammar, has been the focus of attention and admiration for centuries and I think he will remain to be so in future too. The present monograph is a detailed study of the concept of *Lopa* in all its aspects. Dr. Pandit has identified *Lopa* as zero and has further considered it under three heads *Lopa, It* and *Anuvṛtti.* The monograph presents exhaustive materials on the technique of *Lopa* employed by Pāṇini. Dr. Pandit has also compared the concept of *Lopa* with the Concepts of *Śūnya* and *Abhāva* of the Buddhists and of the Naiyāyikas respectively and has come to the conclusion that these philosophical concepts, namely, *Śūnya* and *Abhāva,* cannot be compared with the concept of *Lopa* of Pāṇini.

It appears from what is written by Dr. Pandit in his preface of this monograph that he was initiated to think in this line by an article on "Zero and Pāṇini" by W. S. Allen and subsequently by the article of W. Haas entitled "Zero in Linguistic Description" and the article "Pāṇini and *Lopa*" by S. S. Bhave. Dr. Pandit, then, wrote an article entitled "Zero in Pāṇini" which appeared in 1961 in the journal of M. S. University of Baroda. There was a critical appraisal of Dr. Pandit's article by S. Al-George in his article "Semiosis of Zero according to Pāṇini"

published in East & West. Volume 17, 1967. Since then Dr. Pandit has been thinking on this problem and the present monograph is the outcome of this continuous thinking. It is a matter of satisfaction that Dr. Pandit agreed to my request of presenting the whole data relating to the problem of Lopa or Zero in the technique of Pāṇini in a very systematic manner. I am confident that scholars in the field will appreciate the hard labour Dr. Pandit has put into it and encourage him with constructive suggestions.

V. N. JHA
DIRECTOR
C.A.S.S.
University of Poona

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Preface

Pāṇini's *Aṣṭādhyāyī* is a wonderful literary monument in the field of grammar, exhibiting characteristics of the highest type of technical and descriptive skill even at so early a date as 400-700 B.C., which has always evoked admiration in the minds of all those who have studied it. It is an almost thorough analysis of the Sanskrit language; it is "composed with an algebraic condensation",[1] yet is comprehensive; it is full of technicalities of a highly complicated nature; yet, once they are mastered, it is as clear as any work of scientific nature should be. The greatness of Pāṇini in the field of grammar can hardly be exaggerated only if we remember the fact that all other pre-Pāṇinian grammars, like the Aindra grammar (if it had at all existed),[2] not only receded in the back-ground but are totally lost to-day and also that no post-Pāṇinian grammars like the Cāndra, Śākaṭāyana, Sārasvata etc. could take its place. Even to-day, study of Sanskrit grammar is identified with the study of Pāṇini's *Aṣṭādhyāyī*. The tradition of its study has thus followed an un-interrupted course for over 2000 years, with a voluminous literature in the form of commentaries and sub-commentaries grown around it.[3]

All these commentaries, however, reveal only two main

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1. *cf.* W. S. ALLEN, *Phonetics in Ancient India*, Oxford University Press, London, p.1.
2. For a controversy regarding the existence of an Aindra School of grammar, *cf.* A. C. BURNELL, *On the Aindra School of Grammar*, Basel Mission Book and Tract Depository, Mangalore, 1875, p.25 ff.
3. For a detailed survey of the commentaries and sub-commentaries, *cf.* *S. K. BELVALKAR, Systems of Sanskrit Grammar*, 1915

points of view in which Pāṇini's grammar has been traditionally studied : (1) from the point of view of its applicability to generate the forms of the Sanskrit language which it attempts to describe and (2) from the point of view of examining its fundamentals, viewing it as a scientific system.

1. Applicability : This point of view naturally is concerned with generating the innumerable and various types of forms of the Sanskrit language by applying the rules of grammatical operations and procedures. In doing so, it takes the help of the different technicuqes like *anuvṛtti, adhikāra, maṇḍūka-pluti, it-saṁjñā, pratyāhāra* etc. employed by Pāṇini in his *Aṣṭādhyāyī*. What is important to note in this connection is that while techniques like *it-saṁjñā, adhikāra* etc. are well defined by Pāṇini, others like *anuvṛtti, maṇḍūka-pluti* etc. are left without definition and to the imagination of the students or interpreters. The reason for defining or not defining a technique may be conjectured. If a technique is directly useful for understanding the grammatical process and its stages, for bringing about the different phonological or morphological modifications in the *prakṛti* or *pratyaya,* or in short for generating a form, it is defined by him. Such is the case with techniques like *it-saṁjñā, pratyāhāra, adhikāra* etc. If, however, a technique is primarily necessary in interpreting the *sūtras* of the *Aṣṭādhyāyī*, mechanical generation of forms being reduced to a comparatively secondary level, it is left without definition. This is the case with techniques like *anuvṛtti, maṇḍūka-pluti, yoga-vibhāga* etc. In short, the technique which is helpful in linguistic description is defined while the one helping the *sūtra*-interpretation is not. But one cannot

be sure about such reasons, as there are exceptions like the *sūtras, vipratiṣedhe paraṁ kāryam,* 1.4.2 and *pūrvatrāsiddham,* 8.2.1 which lay down a principle for interpreting the *sūtra*s in the two broad divisions of *Aṣṭādhyāyī*, viz. *sapāda-saptādhyāyī* and *tri-pādī.* But even in such cases one suspects the main reason to be to refer to the grammatical process rather than to actual *sūtra*-interpretation.[4] That Pāṇini took for granted the knowledge of *sūtra*-interpretational principles on the part of the interpreters is clear from the fact that out of all the 133 *paribhāṣās* (i.e. interpretational maxims) collected together by Nagoji Bhaṭṭa in his *paribhāṣenduśekhara,* only 48 are deducible from the Pāṇinian *sūtras,* either explicitly (i.e. the *sūtrasiddhā vācanikī)* or implicitly (i.e. the jñāpakasiddhā); all others are based on other authorities like *laukikanyāya, mīmāṁsānyāya,* Patañjali's *Mahābhāṣya* etc. Also, out of these 48, only 12 are directly i.e. explicitly deducible from Pāṇini's *sūtra*s; the rest are either deducible only indirectly or implicitly or are not accepted by Pātañjali or are disproved or rejected by him as being *anitya.*

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4. This fact that Pāṇini did not think it necessary to lay down the principles for the interpretation of his *sūtras* shows that the principles were sufficiently known in Pāṇini's times. This in turn leads us to pre-suppose a sufficiently long tradition in the field of *sūtra*-system and its interpretational principles. One cannot in this connection refer to NB's *paribhāṣenduśekhara,* which came after 2000 years after Pāṇini and say that the interpretational principles pre-suppose the *sūtras;* in a very narrow sense it is true that interpretational principles cannot come into being if there is nothing to interpret. But it is also true that both the *sūtras* and their interpretinal principles come into being simultaneously and the historical gap between the two is almost nil. What NB did was merely to collect in one place all the interpretational maxims which were scattered.

But this point is not so relevant here as is the other one viz. that the two great commentators on the *Aṣṭādhyāyī*, viz. the Kāśikākāra and Bhaṭṭoji Dīkṣita, who follow the applicability point of view, take all the interpretational principles for granted, utilise them for *sūtra*-interpretation and generate the forms. Their aim is only to apply Pāṇinian rules to account for the formations in the Sanskrit language and not to examine the underlying principles, interpretational, linguistic, logical, axiomatic etc. In other words, their job is only to operate the machine of Pāṇini's grammar without going into the details of its manufacturing process.

Even these two commentators do not follow an identical line of interpretation. The Kaśikākāra holds that the Pāṇinian *sūtras* laying down the saṁjñās (i.e. technical terms) and paribhāṣās (i.e. interpretational maxims) should be interpreted then and there, where they originally occur in Pāṇini's *Aṣṭādhyāyī*, only with the belief that since Pāṇini, the great *ācārya,* has not laid down anything without any purpose or utility (cf. Patañjali on the Pāṇinian *sūtra,* 1.1.1: *pramāṇabhūta ācāryaḥ.... mahatā yatnena sūtraṁ praṇayati sma tatrāśakyaṁ varṇenāpy anarthakena bhavituṁ kiṁ punar iyatā sūtreṇa),* these *sūtra*s are also not introduced for no reason and they have their own purpose when the occasion arises (cf. NB. referring to Kaiyaṭa, in his *paribhaṣenduśekhara* on the *paribhāṣās,* Nos. 2 and 3: *yatra deśe upadiśyate taddeśe eva vākyārthabodheṇa... sarvatra śāstre vyavahāraḥ. tattadvākyārthabodhe jāte bhaviṣyati kiṁcid anena prayojanam iti jñanamātrena saṁtuṣyat ...).* Bhaṭṭoji Dīkṣita, on the other hand, believes that such *sūtra*s should be interpreted only when the occasion demands; they

have no meaning out of the context or occasion (cf. NB *loc. cit : kāryakāle tu tattadvidhipradeśe paribhāṣābudhyaikavākyatā ... yatra kāryam tatropasthitaṁ draṣṭavyam ity uktam).* The Kāśikākāra's view is known by the name of *yathoddeśapakṣa,* whereas Bhaṭṭoji Dīkṣita's position goes by the name of *kāryakālapakṣa.*[5]

These two points of view, which were originally -- and even theoretically now are --- restricted to the interpretation of the Pāṇinian *saṁjñā - sūtras* and *paribhāṣā-sūtras* only, however, came to be applied unconsciously on a general scale to the whole *Aṣṭādhyāyī* and have given rise to two different methods of Pāṇini's interpretation. While the Kāsikākāra comments on the Pāṇinian *sūtras* without disturbing their order, originally laid down by Pāṇini, Bhaṭṭoji Dīkṣita re-arranges the whole *Aṣṭādhyāyī* into different and suitable chapters dealing with *saṁdhi,* verbal and nominal forms and derivatives, compounds etc. and explains it accordingly. This method of Bhaṭṭoji Dīkṣita, it must be mentioned, has proved so useful for the understanding and study of Pāṇini and has gained the general approval to so great an extent that the study of Kāśikā receded in the back-ground and even to-day the study of Pāṇini's grammar for a beginner begins with, and means generally, the study of Bhaṭṭoji Dīkṣita's *Siddhāntakaumudī.*

It must be remembered, however, that in spite of this difference of opinion regarding the method of Pāṇini's

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5. Nāgoji Bhaṭṭa in his *paribhāṣenduśekhara* has discussed the two points of view in detail; *cf.* his commentary on the *paribhāṣās : yathoddeśaṁ saṁjñāparibhāṣam* and *kāryakālam saṁjñāparibhāṣam. cf.* also S. D. JOSHI, "Two Methods of Pāṇini's Interpretation" Journal of the University of Poona, (Humanities), 1965.

interpretation, the two viz. the Kāśikākāra and BD. have one common aim, viz. to apply Pāṇini's rules for generating the various forms of Sanskrit language.

2. As a scientific system : The above point of view of applicability of the Pāṇinian system to the explanation of Sanskrit forms is quite natural since the system is primarily one which deals with a language. Yet, the other point of view, which was held by Kātyāyana and Patañjali, looks to the *Aṣṭādhyāyī* as a scientific system. As a scientific system, it must be based upon certain scientific principles; and Kātyāyana and Patañjali have tried to explore these scientific principles. These principles are of two types : (a) linguistic and (b) interpretational, which in turn are based on certain logical principles. Since the system deals with a language, there is nothing unnatural to assume that it should reveal certain principles of linguistic analysis. Here both Patañjali and Kātyāyana have made their original contribution in the absence of which the whole Pāṇinian system might either have been misinterpreted or misunderstood or even lost or might not have gained an upper hand over the other systems of grammar, pre-Pāṇinian or post-Pāṇinian.

Besides exploring the linguistic principles, underlying the Pāṇinian statements, Kātyāyana and Patañjali have also analysed the various interpretational maxims and their underlying logical principles.

Patañjali and Kātyāyana thus study and examine the fundamental assumptions of the Pāṇinian *sūtras;* in major cases, they have agreed with Pāṇini; in some cases they have suggested some improvements here and there. It is

interesting to note that though Patañjali does not tolerate Pāṇini's criticism at the hands of Kātyāyana, he himself is at liberty to criticise him, sometimes on the same points on which Kātyāyana has criticised Pāṇini. It is also important to note that they have not completely forgotten the applicability aspect of the system to generate the Sanskrit forms, though they do not concentrate on it.

The result of the labour of Kātyāyana and Patañjali has been the firm establishment of Pāṇini's system as wholly scientific and consistent, based on sound linguistic and logical principles.

These are, therefore, the points of view applied by the followers of Pāṇinian school of grammar for its study. There are controversies; but they are not of such magnitude as to open up a third and fresh point of view of Pāṇini's interpretation. These points of view, however, give us an idea of the different problems which the Pāṇinian school of grammar might have faced, after Pāṇini's grammar was composed. The points of attack on the Pāṇinian school seem to be broadly two :- (i) whether Pāṇini's grammar is capable of generating all - or at least sufficiently large number - of forms in Sanskrit language ? And (ii) whether the system is based on some scientific principles, linguistic or logical ? The first point gets its answer in the *Kāśikā* and Bhaṭṭoji Dīkṣita's *Siddhāntakaumudī;* the other type of curiosity is satisfied mostly by Patañjali.

But these problems are such as can only be raised when a grammatical system is already ready. They, therefore, do not give us the idea of the problems faced by a linguist or a grammarian in pre-grammar stage. The modern student

of linguistics, however, who has no ready-made system of grammar in his hand faces problems which are and - naturally bound to be - of totally different nature from that of the above ones, since he starts with linguistic analysis and wants to prepare the grammar.

The value of Pāṇini's grammar to a modern linguist is both for its technicalities as well as for its linguistic description, as the "Work is a linguist's and not a language-teacher's grammar" (W.S. ALLEN : op. cit, p.1) The modern linguist, confronted with different and highly theoretical problems in linguistic and grammatical field, looks for some past authority either for guidance or for support. It is at this stage that Pāṇini may be useful. Grammar-composition, as will be acknowledged, is an art as well as a science. It is an art in the sense that its being as brief as possible, being at the same time most comprehensive, covering all linguistic facts, rests upon individual skill, independent of any extra-individual elements. It is a science in the sense that it requires to be completely objective in analysing the linguistic data and lay down generalisations. If it is to be a scientific, and not a school-teacher's work, it should satisfy some objective criteria applied to a scientific work. While laying down rules to account for the formal phenomena in the language, it should not degenerate into a simple enumeration or haphazard generalisation. It should satisfy the criteria of logical consistency, predictability and generation of only what is grammatical if it is to be a generative, transformational grammar of formal nature. At the same time, it must be remembered that all this should not be attempted at the cost of actual linguistic usage. What it

generates should be, first, grammatical and secondly, which is more important, must be acceptable to the speakers of the language.

But the problem is : how could this be achieved ? What does grammaticalness consist in ? Is only that, which is formal, grammatical and that, which is non-formal, non-grammatical ? Theoretically and verbally it may be. But language does not consist of such watertight compartments. The speaker mixes both these elements into one and uses the expression for the communication of his thoughts. For the speaker, the distinction between the word *aśva* ('a horse') and its meaning is neither necessary nor striking for every day communication. He uses it simply through intuition or habit. But grammar cannot be based either on intuition or habit. It has to, on account of the very nature and scope of the activity, make a distinction between the thing signified and the word signifying it, and lay down the rules accordingly. But has this clear demarcation any limit ? Is there a point where a grammar cannot describe a form without any reference to its non-grammatical aspects ?

Take for granted for the sake of argument that these difficulties are solved, the language is thoroughly analysed into two broad, mutually exclusive groups, viz. the formal and non-formal and the latter i.e. non-formal categories are totally excluded from the formal province. One may even be at a loss to know as to what to do with the formal categories, if grammar is to be purely formal ? It is not easy to describe them in such a way as to cover the maximum number of cases with the minimum number of statements.

Should then one proceed by simple enumeration and call it grammar ? If the answer is yes, first, that would not be brevity. Secondly, from logical point of view, it would not attain the status of a strictly scientific work since, obviously, there is no guarantee in such a work itself-not to speak of the language and its speakers - that an entirely new form, not included in the list, will not assume a different phonological shape in its declension or conjugation from those listed or that it will not take a different affix. If the answer to the above question is 'no', the question then would be : how to proceed ?

Pāṇini on his part has employed different types of technical devices like the *pratyāhāra, it-saṁjñā, lopa* etc. which have proved very useful in two ways. First they have enabled him to attain brevity in covering maximum number of cases with minimum number of statements. Secondly, they have enabled him to prepare a scientific system with an element of predictability in it. True that this is not the only criterion of a scientific system; but from the practical point of view, this is an important requirement of a system. The result of this has been that though Pāṇini has no say in the matter of what form a speaker should use on a certain occasion, he certainly has provided the necessary apparatus for the forms the speaker wants to use and enabled him to predict the phonogical statement which a newly-used or newly-admitted base would give out according to the rules of his grammar. From this point of view, the importance of Pāṇinian techniques in matters of brevity and predictability can hardly be exaggerated. These techniques of Pāṇini, therefore, provide an interesting field for study.

These techniques by their nature are very complicated and betray an advanced or mature stage in their invention and employment or applicability in a system. One is naturally led to suspect if they are the result of a long tradition in technique-development and not Pāṇini's own creation. If they are not Pāṇini's own creation, they seem to have been borrowed from other sciences, as they are purely extra-linguistic. In that case one is led to pre-suppose a certain advance in the fields from which they are borrowed. This in turn leads to the pre-supposition of a long tradition in the different scientific fields other than linguistics. Thus, in any case, if one wants to exclude the element of divine grace, one is led to search for the history and underlying principles of the technicuqes. This is further supported by the fact that many of the techniques and technical terms have been used by pre-Pāṇinian grammarians.[6] These techniques, it must be remembered, are of two types : (1) descriptive techniques and (2) interpretational maxims (paribhāṣās); the latter have already been studied in detail by many commentaters on Pāṇini, from Patañjali upto Nāgoji Bhaṭṭa. But the former are not so critically studied. And hence the necessity of the critical study of Pāṇini's descriptive techniques from the point of view of their history and underlying principles which will enable one to trace their origin. It must also be remembered that Pāṇini's grammar is the only source for the study of these descriptive techniques. And hence even for the study of descriptive techniques for their own sake, Pāṇini's grammar can hardly be over-looked.

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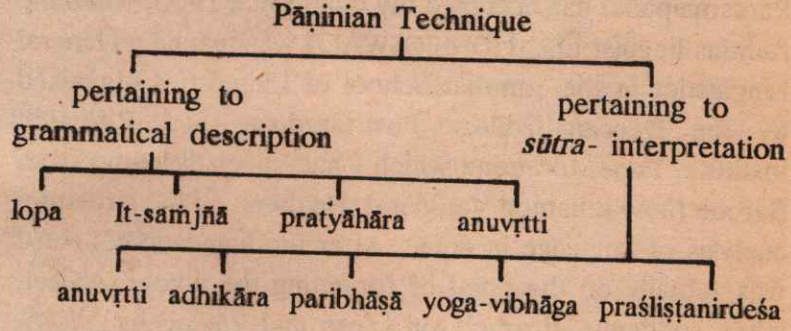
6. For a detailed discussion, *cf.* K. C. CHATTERJI, 'Technical Terms in Sanskrit Grammars'.

The same type of historical study is possible in the case of Pāṇini's grammar itself from the point of view of its underlying principles of linguistic analysis and grammatical description.

Pāṇini's grammar cannot be a sudden off-shoot of its kind. Its very nature betrays characteristics of a highly technical and logical system, pre-supposing a long tradition of study in the field of linguistics in general and grammar in particular. This is testified by the fact that Pāṇini himself refers to not less than ten grammarians as his predecessors. The list of pre-Pāṇinian grammarins, not referred to by Pāṇini, actually covers as many as 67 names (cf. A.C. BURNELL, ibid p.32-33). All these grammarians, again, pre-suppose the voluminous literature of the Vedas, the Brāhmaṇas and the prātiśākhyas. Even the division of the Vedic words by the padapāṭhakāra is sufficient to show a high degree of linguistic i.e. morphological analysis in pre-Pāṇinian times, not to speak of the phonetic and phonemic studies. (cf. S VARMA : *Critical studies in Phonetic Observations of Indian Grammarians,* First Indian Edition, 1961, pp.1-4) It is, therefore, unthinkable that Pāṇini's grammar is the only and sudden attempt of its type in ancient India without any tradition in the field. Unfortunately in this case also, no pre-pāṇinian work on grammar has come down to us to enable a comparative and historical study of the grammatical and linguistic principles. We have, therefore, to rely solely on Pāṇini's grammar itself to explore into the foundations of his techniques used in linguistic description.

We can analyse the descriptive techniques, defined or

undefined by Pāṇini into two broad categories : (i) techniques pertaining to or helping in grammatical description of forms and (ii) techniques pertaining to or helping in the *sūtra*-interpretation. The following Table will give a clear picture -



Of all these, the technique of *anuvṛtti* is common to both the types, since it can be used in both the fields of grammatical description and *sūtra*-interpretation. It includes *maṇḍūka-pluti* also. The present monograph tries to study the techniques used by Pāṇini in grammatical description of the Sanskrit forms.

Surprisingly enough, as will be clear from what is presented in the work, all these three descriptive techniques viz. *lopa, it-saṁjña* and *pratyāhāra* and the fourth one *anuvṛtti* seem to have been based on one single principle, viz. *lopa*, which can be rendered by the modern term zero. Thus, the *lopa* works in all these three or four spheres. We have the *lopa* of linguistic categories like *śap* etc., of the extra-linguistic category of the *it*-sounds of the *pratyāhāras* and *pratyayas* and of the common elements which are dropped out in the succeeding *sūtras*. The present work tries to study and examine all these situations and find out the

principles and/or similarities of these techniques in other science with a view to trace the origin of these techniques.

The subject of the *lopa* or zero (lit. disappearance, from the root √lup, Pāṇinian *lupḷu,* 6th conj. Parasmaipada) has occupied my mind since 1955, when the famous linguist DR. HONIEGSWALD was teaching General Linguistics in the Summar School of Linguistics organised by the Deccan College Post-Graduate and Research Institute, Pune, to attend which I had specially come from Baroda (now renamed Vaṭodara). He dwelt on the structural analysis of language in detail. After the linguistic course, I was actually on the point of forgetting the whole subject, when suddenly an article on 'Zero and Pāṇini' by W. S. ALLEN appeared in Indian Linguistics Vol. 16, 1955. It made an interesting reading, disturbing me again. It was followed by article by W. HAAS entitled 'Zero in Linguistic Description, *Studies in Lingustics,* (Special Volume of the Philological Society, Oxford), 1957. These three lingusticians helped me in the initial stage to clear many ideas about linguistic description. But still the sky was not clear. I then discussed the subject again with my teacher, the late DR. S. S. BHAWE of Baroda (whose teaching and discussions, full of clarity, always made me more enlightened and confident) who had worked a little on the topic and had delivered a lecture on 'Pāṇini and *lopa*', to the Pāṇini-students of the Summar School of Lingustics, Pune 1960. The discussion brought me more light. Then, last but not the least, I came into contact with DR. D. D. MAHULKAR of the Department of English and, later on, Linguistics, M. S. University of Baroda, Baroda who had then just returned from England. Discussions held with him

gave me the clear idea of the differences between the traditional and the modern approaches to the linguistic description. And when I started reading Pāṇini (which I had already studied traditionally with my father, the late DEOKRISHNA KESHAV PANDIT) from the new point of view, I found that Pāṇini was not totally unaware of the structural approach. After reading Pāṇini over and over again, I ventured to put my thoughts on the subject of *lopa* in my first article entitled 'Zero in Pāṇini' published in the Journal of the M.S. University of Baroda in 1961. Then I became complacent.

Yet, this complacence was disturbed by an article by SERGIU AL-GEORGE on 'Semiosis of Zero according to Pāṇini' *(East and West,* Vol.17, 1967) which made a very critical appraisal of my article. This again set my thoughts on the subject. I was all the while thinking about the topic since then and I decided to make a thorough study of all the situations in Pāṇini's grammar, irrespctive of the fact whether the zero was lingustic or not, in which Pāṇini can be said to have employed the technique of *lopa* or zero. And I found that he has employed the technique of zero in three spheres.

The first and most important from the point of view of linguistic description is the sphere of grammatical analysis and description. The second one is the sphere of *it-saṁjñā* which is an extra-grammatical or even extra-linguistic technique used in the field of linguistic description. And the third is that of the *anuvṛtti* in which the non-mention of the common elements amounts in final analysis to a zero in an implied sense. What is more interesting is that I also found that these three zero-techniques have some tradition or

foundation, crude or clear, in the writings of the pre-Pāṇinian authors on Veda, Brāhmaṇa, Upaniṣads etc. I also get a feeling which I have mentioned in the present work, that all these three zero-techniques with different aims and objectives in view, have a sort of inner or basic similarities with the techniques used in mathematics, ancient and modern. I have tried to put up my thoughts in as neat and clear terms as possible. How far I have been successful in driving my thoughts to readers is anybody's guess.

I tried my best to find out whether there exists any similarity or borrowing between the Pāṇinian *lopa* i.e. Zero and the *śūnya-vāda* of the Buddhism on the one hand and the *abhāva-vāda* of the Naiyāyikas. But after analysis they are found to be totally different. First, neither the Buddhism nor the Naiyāyikas present us any formal analysis based on position. In other words, there is no formal procedure as such. Secondly none of them defines in clear terms the *śūnya* or *abhāva*. The concept of *śūnya* (which means 'Zero') is based upon the idea of the negation of any positive entity and the definition of *abhāva* of the Naiyāyikas is related to and is based upon *bhāva*. *cf. Siddhānta Candrodaya*, a commentary on *Tarka Saṁgraha*, by Śrikṛṣṇa Dhūrjaṭi : *pratiyogijñānādhīnaviṣayatvam abhāvatvam; cf.* also *Siddhānta Muktāvali* of Viśvanātha Pañcānana : *dravyādiṣaṭkānyonyābhāvatvam.* A third definition of *abhāva* given by *Sarvadarśanasaṁgraha is : asamavāyatve satyasamavāyitvam.* The *Nyāyamañjarī (prathamāhnika,* on the topic of *abhāvasya pramāṇāntarato nirāsaḥ)* says : *na hi niḥśeṣasāmarthyarahitatvam abhāva-lakṣaṇam; api tu nāstīti jñānagamyatvam. satpratyayagamyo hi bhāva iṣyate, asatpratyayagamyas tv abhāvaḥ iti.* Thirdly,

the *śunyavāda* of the Buddhists is not a technique but refers to the ultimate, highest philosophical principle. The *abhāva* of the Naiyayikas is also not a technique used to explain some other thing, but one of the seven *padārthas* which are taken by them as the basic entities; *cf.* Tarkasaṁgraha : *dravyaguṇakarmasāmānya-viśeṣasamavāyābhāvāḥ sapta padārthāḥ,* which can be compared only with the six *vyavasitas* accepted as basic entities in Pāṇini's grammar. There are thus glaring and basic differences between the approaches and concepts of the grammatical system of Pāṇini on the one hand and the philosophical systems of the Buddhists and the Naiyāyikas on the other. All my attempts to compare and co-relate the Pāṇinian zero with the zero of the Buddhists and Naiyāyikas, therefore, brought no results. The only conclusion after comparing these three I arrived at is that they cannot be compared or related, let alone the question of mutual borrowing. The only system which offers a possibility of the comparison of the Pāṇinian zero is of mathematics which is based on positional analysis.

I profitted to a very great extent from the personal discussions on the topic of linguisitc zero with (the late) PROF. DR. S. S. BHAWE and with PROF. DR. D. D. MAHULKAR. I am especially very much grateful to PROF. D. D. MAHULKAR who guided my thoughts in the initial stage and was very keen to see me writing on the topic of the zero in Sanskrit grammars in general and in Pāṇini's grammar in particular. It was because of his encouragement and guidance that I could write my first (in every sense) paper on 'Zero in Pāṇini' in 1961. I am really obliged to both of them.

My thanks are also due to PROF. DR. V. N. JHA,

Director, Centre of Advanced Study in Sanskrit, University of Poona, Pune, who encouraged me to write newly on the subject of zero in Pāṇini's grammar in the form of a monograph. I, therefore, collected all the possible situations in which Pāṇini has made use of the technique of *lopa*. But for DR. V. N. JHA's insistence, the present work would not have been possible. I am also thankful to DR. SRIMATI UJJVALA PANSE, (now, MRS. JHA) Research Associate, CASS for providing me the relevant references on *abhāva* from the *Nyāya* literature. I thank also DR. SRIMATI S. S. BAPAT, Lecturer in Sanskrit DR. J. R. JOSHI, Lecturer in Pāli, and DR. SHIV KUMAR, Reader in the Centre of Advanced Study for providing material on the topic of buddhistic *śūnyavāda*. I am also thankful to DR. SANJAY DEODIKAR, Research Associate in the Centre of Advanced Study in Sanskrit for the arduous task of going through the proofs.

12th December, 1989
Dattajayantī.

M. D. PANDIT

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I

The Linguistic Zero

1. Introductory

Pāṇini's grammar is a master piece of the technical skill combined with almost total comprehension of the data on which he is working and has stood the test of time for all these 2500 years. As such it has been a subject of grammatical studies in India and abroad. It has exercised such an impact of perfection and authority that grammatical studies came to be identified with the study of only Pāṇini's Aṣṭādhyāyī in ancient and even in modern India. The Western scholars who first studied Pāṇini were impressed by his technical skill and scientific accuracy and perfection.

Pāṇini has used many techniques like *it-saṁjñā, ādeśa, āgama,* technical terms like *ghi, ghu, ṭi* etc. which look apparently meaningless. From the usage of such a highly developed technique in Pāṇini's grammar, one is always tempted by the idea of a comparison of the Pāṇinian techniques with those adopted in sciences like modern mathematics, computer or even symbolic logic. The technique of *lopa* or zero which Pāṇini has employed in his grammar for descriptive purposes is one such technique.

The scope of the present monograph is to study this technique of zero used by Pāṇini in its entirity. As we go through Pāṇini's grammar we find a zero employed in the case of the form *atti,* from √*ad,* 2nd conj. 3rd pers. sing. We also find that there are some sounds used by the Śiva *sūtras* and by Pāṇini which are termed as the *it*-sounds. Though their presence is visible on the arbitrary, technical

plane, they are made to go away afterwards. Pāṇini has also used the technique of *anuvṛtti* in which some common words from the preceding *sūtras* are dropped out from the succeeding *sūtras*. Looked from the point of view of a technique of axiomatics, the words which are dropped out are nothing but zeroes. So we have three types of zero-technique used by Pāṇini in his *Aṣṭādhyāyī*. The present work aims at the study of all these three types of zeroes from different angles and attempts to find out the possible origin of this technique.

2. The concept of 'zero' has occupied a great deal of attention of modern linguists, especially that of the structuralists among them.[1] It is but natural that 'zero' should be a matter of investigation for the structuralists since the structural studies, while trying to study a language with a technique different from the traditional one, sometimes encounter a peculiar situation where nothing - neither a phoneme nor a morpheme - is found but something has to be accounted for. 'Zero', it must be emphasised at the outset, does not mean simply 'the absence of anything'. It is something positive which has attained the position of a concept with the help of which a general symmetrical rule[2] can be laid down to cover up even those exceptional cases

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1. *cf.* W. S. ALLEN : 'Zero and Pāṇini', *Indian Linguistics*, Vol. 16, November 1955, Poona, pp. 106-113; *vide* also W. HASS : 'Zero in Linguistic Description', *Studies in Linguistic Analysis*, Special Volume of the Philological Society, Oxford, 1957, pp.33-53, in which he has discussed different types of zeroes even those "which intend no reference to linguistic elements" (p.34)

2. *cf.* W. HAAS (ibid. p.49) "...We acknowledge that the use of 'Zero' in Linguistic Description is motivated by requirements of generalisation..."; *cf.* also W. S. ALLEN, ibid, p.112.

which otherwise would require special enumeration and treatment. The concept of 'zero' is thus only a 'logical device' and no empirical correlate for it need be sought after.

Let us take an example from Sanskrit, say, of roots √*khād* (1st conj.) and √*ad* (2nd conj.) both meaning 'to eat'. The grammatical statement of pres. 3rd pers. sing. of √*khād* according to Pāṇini is as follows :

khād+śap+ti

= *khād+a+ti*

= *khādati.*

In the case of √*ad,* which being in the 2nd conjugation takes no *vikaraṇa* or middle morpheme, it is as follows :

ad+ti

= *ad+śap+ti*

= *at+ti*

= *atti,* the *Vikaraṇa śap* being lost according to *adiprabhṛtibhyaḥ śapaḥ,* 2.4.72.

Here it is quite clear from the analysis of the two forms that while the form *khādati* has one *a* between the root *khād* and the termination *ti,* the form *atti* has no such infix. There are, therefore, two ways of accounting for the forms. One might start in such cases with the minimum form *atti* and go to the maximum form *khādati*[3] by adding one *a* in between. One might also start, on the other hand, with the

3. The statement should be understood only with reference to the present two cases. There are still larger forms like *corayati* (10th Conj.) or *jigamiṣati* (des. of √*gam* 'to go') than the present *khādati.*

maximum form *khādati* and proceed to the minimum form *atti,* only to discover the absence of the infix *a* in between. The two statements according to the two approaches will be as follows :

First, starting with the minimum *atti* :

atti=at+ti=ad[4] *+ti*

khādati=khāda+ti

= khād+a+ti.

Second, starting with the maximum *khādati* :

khādati = khāda+ti= khād+a+ti

atti=at+ti=ad+0+ti= ad+ti.

It can be seen, therefore, that methodically the concept of 'zero' is as inevitable in the second kind of analysis as it is in the positional arithmatic. It is this second kind of analysis which has been in favour with modern structural linguistics. It is clear from Pāṇini's *sūtra* 2.4.72 (quoted above) that he too had favoured this approach in certain cases.

It would not be impertinent to ask why Pāṇini and modern structural linguists chose the second way of describing language phenomenon. There is certainly nothing wrong in describing it in the first way. To say that there is an absence of *a* in *atti* would, from common man's point of view, be as good as saying that there is an addition of *a* in *khādati.* In order to understand the problem posed

4. The assumption of original *t* or *d* will again depend upon individual choice and technique dependent upon it. Pāṇini has assumed *ad* as the original norm.

here, it is necessary to know that a certain description of phenomenon might be satisfactory from the point of view of practical utility, but not so from a theoretical point of view. Pāṇini's grammar, it is universally agreed, was written not only from the point of view of practical utility in class-room teaching, but also from the point of view of a logically consistent system. He might have, therefore, thought it logically more satisfying to disclose the full form of a verbal formation first, and then show what is dropped out of it in other formations than to take a minimum formation first and to add newer affixes every time. The second procedure might have raised the question : where do these new elements (like *a* in the above examples) come from ?[5]

At this stage one is tempted to say many things about Pāṇini, viz. that he was a structuralist long before structural linguistics came into existence; that he was a great logician long before modern logic was established; that he was the first man to use the mathematical concept of 'zero' before mathematicians accepted it. All these problems are discussed at greater length in the last chapter. At this stage it is sufficient to make a search for the function of 'zero' in Pāṇini's grammar, to give a grammatical statement of representative cases and to see whether there was only one 'zero' or different types of 'zeroes' introduced to meet different circumstances. In the following lines, therefore, are represented the circumstances where the idea of 'zero' can be said to have been utilised by Pāṇini. Hence the title

5. I am highly indebted to PROF. D. D. MAHULKAR, formerly Professor of Linguistics, Faculty of Arts, Baroda, for explaining to me this point of distinction between the two approaches.

of the monograph should actually be expanded to "the use of 'zero' in Pāṇini's grammar", because as will be clear from the cases represented below, Pāṇini has made abundant use of the concept of 'zero', called *'lopa'* in his terminology.

3. Definition of *lopa* by Pāṇini.

lopa is defined by Pāṇini in *adarśanaṁ lopaḥ,* I.I.60, the straight literal meaning of which is 'non-appearance (of a sound or morpheme) is *lopa'*. But as the science viz. the grammar in which the word is used deals with 'hearing or pronouncing' the words or sentences and not with 'seeing or appearing', √*dṛs* 'to see', from which the word *(a)-darśana* in the *sūtra* is derived, is taken in a wider sense by the commentators, *viz.* 'to hear or to pronounce', or in general in the sense of 'knowledge'.[6]

According to Kāśikā, a commentary on Pāṇini's *sūtras*, the word *adarśana* signifies many senses, viz. (I) *aśravaṇam* (non-hearing), (2) *anuccāraṇam* (non-pronunciation), (3) *anupalabdhiḥ* (non-availability), (4) *abhāva* (non-exitence) and (5) *varnaviṇāśa* (loss of sounds).[7] Thus, we get that when a sound (or sounds) is not heard, pronounced, available or existing or is lost anywhere even if its place

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6. *cf.* Taṭṭvabodhini, a commentary on Bhaṭṭoji Diksita's (=BD) *Siddhānta Kaumudi,* on the *sūtra* 1.1.60 : *atra dṛsir jñānasāmānyavacanaḥ/darśanaṁ jñānam/tad iha śabdānu-śāsanaprastāvāt śabdavisayakaṁ sat śravaṇam saṁpadyate/tac ca śrotṛvyāpāras tanniṣedhaḥ aśravaṇam; cf.* also the *vārttika, dṛśeś ca* on 1.4.52 which takes √dṛś as signifying the meaning 'to know' *(buddhyarthaka)*

7. *cf.* Kāśikā on 1.1.60 : *adarśanam aśravaṇam anuccāraṇam anupalabdhir abhāvo varṇavināśa ity anarthāntaram/etaiḥ śabdair yo'rtho'bhidhīyate tasya lopa itīyam saṁjñā bhavati //*

there is due on that occasion, it is said to be *lupta i.e.* disappeared. In other words, if a sound is not found in the place in which it should have been according to the rules of Pāṇinian grammar, it is said to have amounted to zero. Thus, in the form *daśati,* whose original root is reconstructed by Pāṇini as *√daṁś,* the nasal *ṁ* was expected; but it was not there in the spoken language, and hence Pāṇini had to make the provision for its *lopa* (cf. 6.4.25) and thereby the nasal which was due *(prasakta,*[8] lit. attached) according to Pāṇinian reconstruction was not to be pronounced etc. Thus, *lopa* is disappearance or non-pronounciation etc. of a sound or sounds after its appearance or pronounciation etc.

As opposed to this, if there is absolute non-hearing or non-pronounciation etc. not related to its prior hearing or pronounciation or appearance, it is called as *avasāna,* defined by Pāṇini in *virāmo'vasānam,* I.4.110. This *avasāna* corresponds to 'the pause' of modern linguistics and refers to the end or completion of a sentence or fully-formed or fully-declined word.[9] We may term this *avasāna* as absolute zero as opposed to *lopa* which is a zero related to grammatical circumstances or necessity. In grammar or linguistics it is obviously the *lopa* that is of use for the analysis and studies of the structure of a language and not the *avasāna.*

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8. *cf.* BD's explanation of 1.1.60 : *prasaktasyādarśanaṁ lopasaṁjñaṁ syāt cf.* also Kāśikā : *prasaktasyādarśanaṁ lopasaṁjñaṁ bhavati,* in both of which the word *prasakta* is a pointer to the above fact. *cf.* also Patañjali; *astu tarhi prasaktādarśanaṁ lopasaṁjñaṁ bhavatītyeva. cf.* Kaiyyaṭa's *pradīpa : śāstrād arthād vā prasaktasya yad adarśanam,* etc. *cf.* also Patañjali who uses the word *sat* for *prasakta : nityeṣu ca śabdesu sataḥ adarśanasya saṁjñā kriyate.*

9. *cf.* BD : *varṇānām abhāvo'vasānasaṁjñaḥ syāt.*

As is demonstrated above (in the example of *daśati)* it is not the language but the technique of Pāṇini that required the elision of the nasal. *lopa*, therefore, becomes an instrument and attains the status of a technical device which helps an analyst in satisfactorily framing the general symmetrical rules regarding the formations. The province of the *lopa* in Pāṇinian grammar varies from a single sound *(varṇa)* to a group of sounds, whether in the beginning, in the middle or at the end.

4. Different ways in which *lopa* is intended :

In laying down the rules of *lopa*, Pāṇini has adopted a double technique. In some cases he lays down the preservation of a sound or sounds without explicity stating the disappearance of other sound or sounds, though in effect the rule brings out the disappearance of the latter.

Such a statement in effect aims at the implication of zero and hence this type can be conveniently termed as 'an implied zero'. As opposed to this, there are statements which explicitly lay down the disappearance or zero of a sound or sounds; this type can be called as 'an express zero'. He adopts this double technique of describing the zero both on phonetic as well as morphemic levels. The terms used to signify 'the implied zero' are (i) sometimes *pūrva-rūpa-ekādeśa*[10] (= being merged with the preceding sound) or *pararūpa-ekādeśa* (= being merged into the following sound) and (ii) √*śeṣa* (from *śiṣ* 'to remain', *śeṣa*=

10. That *pūrvarūpa-ekādeśa* or *pararūpa-ekādeśa* signify 'implied zero' does not mean that they always signify zero or lopa. What it means is that in some cases where *pūrvarūpa-ekādeśa* etc. is given, it results into the loss of following or preceding sound or sounds.

remnant). The following examples taken from both the phonetic as well as morphemic levels will clarify the point.

4.1. phonetic level (for *pūrvarūpa-ekādeśa)* : Let us take the example of the form *hareḥ,* gen. sing. of *hari.* The grammatical procedure is as follows :

hari+ṅas (gen. sing. termination according to 4.1.2)

= *hari+as (ṅ=0* according to 1.3.8 : *laśakvataddhite)*

= *hare+as* (i.e., according to 7.3.111. : *gher ṅiti)*

= *hare+*(0)*s,* the *a* of *as* being merged into the preceding *e* according to 6.1.110 : *ṅasinasośca.*

= *hares*

= *hareḥ.*

Here, therefore, is an example of the *pūrvarūpa-ekādeśa* amounting to zero, because though theoretically the *sūtra* lays down *pūrvarūpa-ekādeśa,* in practical situation (of speaking) the *a* of *as* totally loses its existence.

The *sūtra* 6.1.98 *(avyaktānukaraṇasyāta itau)* provides an example for the *pararūpa-ekādeśa* resulting into a zero. The example is *paṭat* (an imitational sound) + *iti=paṭ* (0) (the whole *at* merging into *i* of *iti) + iti = paṭiti.*

The word śeṣa removes all the consonants, except the first, of a reduplicated base. Take, for example, the root √garj 'to resound'; when reduplicated (according to 6.1.8 which is under the *adhikāra* 6.1.1 : *ekāco dve prathamasya)* the situation is : *gaṛj-garj.* Now, according to 7.4.60 *(halādiḥ śeṣaḥ)* which states that only the first *hal* i.e. consonant of the reduplicated base *(abhyāsa)* remains, (in the present case, only g remains; the group *-rj-* in effect

going away), we get *ga (0) - garj = jagarj+a = jagarja* (perf. 3rd pers. sing.)

4.2. On the morphemic level : The best example of an implied zero by the word *śeṣa* is provided by *dvandva* compounds of a fem. with a masc. form, in which only the fem. or the masc. form or gender remains, the other going away. Let us take the compound of the word *putra* (a masc,) with *duhitṛ* (a fem.). Actually the compound should be *(putras ca duhitā ca) putraduhitarau;* but according to I.2.69 *(bhrātṛputrau svasṛduhitṛbhyām)* which states that the words *bhrātṛ* and *putra* remain when compounded with words *svasṛ* and *duhitṛ* (both the latter in result disappearing), we get,

putra-duhitar-au = putra (0) au = putrau

The express zero can also be described in the same way as the 'implied zero', both on phonetic as well as morphemic level. On the phonetic level, the sound that disappears can either be a simple sound (as *a, ā, i* etc.) or a nasal or an *apṛkta* sound *(Pāṇinian apṛkta* al) or a penultimate (Pāṇinian *upadhā).*

4.3. For the loss of the simple sounds *a, ā,* etc. many *sūtras* are available such as *ato lopaḥ* 6.4.48 (for *a), iṭa īṭi,* 8.2.28 (for *s)* etc. which need not be illustrated here.

4.4. For the loss of a nasal, let us take the case of √*daṁś* 'to bite'. Its pres. 3rd pers. sing. form actually ought to be : *damś + (ś)a(p) + ti = daṁśati.* But according to 6.4.25 *(daṁśasañjasvañjāṁ śapi)* the nasal of roots √*daṁś,* √*sañj* and √*svañj* disappears before *śap* (the *vikaraṇa* of the Ist conjugation), with the result that the form is *daśati.* Thus,

da(ṁ)sati = da(0)śati = daśati.

4.5 Loss of the *apṛkta* sound : The *apṛkta* (dissolved into *a* + *prkta.*, the latter a past pass. part. in *(k)ta* from √pṛc 'to come in contact, to get connected') which literally means 'not connected with or detached,' of course, from the *it*-letters, is defined by Pāṇini in 1.2.41 (*apṛkta ekāl pratyayaḥ).* Thus for example the *v* which singularly remains behind after all the *it*-letters in terminations *kvin, kvip, ṇvi* etc. are lost is an *apṛkta sound.*[11] The loss of the *apṛkta v* is given by Pāṇini in 6.1.67 *(ver apṛktasya),* and we get the root-noun *bhāk* from √*bhaj,* the termination being *ṇvi* according to 3.2.62 *(bhajo ṇviḥ).* The process arrangement is as follows :-

bhaj + ṇvi

= *bhāj + ṇvi (vṛddhi* according to *acoñṇiti,* 7.2.115)

= *bhāj + 0vi (ṇ = 0* according to *cuṭū* 1.3.7)

= *bhāj + 0v0 (i = 0* according to 1.3.2 and 1.3.9)

= *bhāj + 000 (v = 0* according to 6.1.67 quoted above)

= *bhāk or bhāg (j > k* or *g* according to 8.2.30 *coḥ kuḥ)*

It can be seen, therefore, that the whole termination *ṇvi* is a zero termination due to the loss of the *apṛkta v.* Similar is the case with other zero terminations viz. *kvin, kvip* etc.

4.6 The loss of the penultimate sound *(upadhā)* : The

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11. The definition of *apṛkta,* as the word *pratyayaḥ* in it shows, is applicable only to sounds of terminations which remain behind, and not to any other residue sounds; thus, for example, the remaining *al viz.* i of the *Pāṇinian* root √*iṇ* 'to go' (2nd conj.) is not *apṛkta* since √*iṇ* is not a termination *(pratyaya).*

upadhā (defined by Pāṇini in 1.1.65 *alo'ntyāt pūrva upadhā)* amounts to zero in the aor. caus. 3rd pers. sing. of √pā 'to drink'. After all the necessary additions and changes, the pre-final stage in the grammatical operation is :

apīpay + a + t. Here according to 7.4.4 *(lopaḥ pibater īc cābhyāsasya,* which also turns *a* of the reduplicated base *pa* into *ī)* the penultimate sound of *apīpay* viz. *a* is lost and we get :

apīp(0)y + a + t

= *apīpyat.*

4.7 On the morphemic level, we get three main divisions *viz.* the loss of the morpheme (i) in the beginning (2) in the middle and (3) in the end.

The loss of the morpheme in the beginning is found especially in cases where reduplication of the base takes place *i.e.* in (a) the pefrect tense, (b) the desiderative and (c) the frequentative; the last one *viz.* the frequentative reduplication has no case of the loss of its reduplicated base.

4.7.1 The loss of reduplicated base in the perfect is found in the case of some roots of the 1st conj. in the Ātmanepada. Take, for example the root √yat (Ātm.) 'to try, to attempt'. The process to get the perf. 3rd pers. sing. form *yete* is as follows :-

yat-yat

= *ya-yat (t=0* according to 7.4.60 quoted above)

= *0-yat* (loss of the reduplicated base according to 6.4.120 : *ata ekahalmadhye'nādeśāder liṭi,* which also turns *a* of *yat* into *e* and we get)

= *0-yet + e* (3rd sing. termination, Ātm.)

= *yete*

4.8 In the desiderative, the reduplicated base is lost in cases noted by Pāṇini in *sūtras* 7.4.54-57. Let us take the root √*sak* 'to be able'. The stages in the grammatical process are :

śak-śak (reduplication)

= *śa-śak (k = 0* according to 7.4.60)

= *śi-śik* (*a > i* according to 7.4.54)

= *śi-śik+sa* (the des. *vikaraṇa)*

= *śi-śik + sa + ti* (pres. 3rd sing. termination)

= *0-śik + sa + ti* (the reduplicated base *śi* = 0 according to 7.4.58 *atra lopo'bhyāsasya)*

= *śikṣati.*

4.8.1 For the loss of the middle morpheme *(i.e.* that which is inserted between the stem, verbal or nominal, and the terminations), the *vikaraṇas* (the modificatory terminations) *viz. śap* etc., or the *sic* or *cli* or *caṅ* or *yaṅ* (added to signify frequentative sense) etc. furnish good examples. The example of *khādati* and *atti* given in the beginning of this article illustrates the loss of the *vikaraṇa śap.* For *sic* amounting to zero, the aor. form *abhūt* of √*bhū* is a good example. The stages in grammatical operation are as follows :-

bhū + luṅ (denoting the aor.)

= *a* (the thematic *aṭ* according to 6.4.71) + *bhū + l (u* and *ṅ = 0)*

= *a + bhū + ti* (replacing *l* according to 3.4.77 and 3.4.78)

= *a + bhū + t (i = 0* according to 3.4.100 : *itaś ca)*

= *a + bhū + cli + t (cli* inserted according to 3.1.43 : *cli luṅi)*

= *a + bhū + sic + t (sic* replacing *cli* according to 3.1.44: *cleḥ sic).*

At this stage, we get *a + bhū + 0 + t,* the *sic* disappearing in the Parasmaipada according to 4.7.77 : *gātisthāghupābhūbhyaḥ sicaḥ parasmaipadeṣu,* and the form is *abhūt.*

4.8.2 The end-morphemes are all those which are applied at the end to form all the verbal conjugational and nominal declensional forms and primary (the *kṛt)* and secondary (the *taddhita)* derivatives. In the loss of these morphemes, Pāṇini has two technical divisions, (a) The potent or strong loss or zero and (b) the impotent or weak loss or zero.

(a) In the case of the potent or strong zero, the termination or the sound or any entity for that matter which disappears retains even after disappearing its potent power to bring about any modification, *viz. guṇa* or *vṛddhi* or accentuation etc. in the stem. The loss of such terminations is laid down by the express term *'lopa',* defined in the general definition of *lopa viz. adarśanaṁ lopaḥ,* 1.1.60.

(b) As opposed to this, in the case of the impotent or weak zero, the termination after its disappearance loses its power of bringing about any modification in the stem; that is to say, it simply amounts to zero leaving no trace of itself.

The loss of such terminations is given by the three terms *luk, ślu* and *lup* defined in 1.1.61 : *pratyayasya luk-ślu-lupaḥ.*

5. Functional power of zero

The sutra which gives to the strong zero defined by the word *lopa* the power of bringing about any modification is 1.1.62 : *pratyayalope pratyayalakṣaṇam,* and the *sūtra,* which prohibits the weak zero laid down by the terms *luk, ślu,* and *lup* to exercise its power to bring about any modification, is 1.1.63 : *na lumatāṅgasya*[12]. The examples given below denoting the working of the zero by the word *lopa* and *luk, ślu, lup* will make the point clear. It should be remembered here that this two-fold division of the zero is applied only to the *pratyayas,* and not to any other category such as *abhyāsa* or *ṭi* or *bha* etc.

The same example of the end morpheme which is given above while discussing the express loss of an *apṛkta*-sound will do to show the working of the strong zero as well as the loss of the whole end-morpheme. It will be seen *(cf.* the various stages in grammatical operations laid down there) that though the beginning *ṇ* of the termination *ṇvi* goes away, it is capable of bringing about the *vṛddhi* of the vowel *viz. a* in the root *bhaj* since its disappearance takes place by the word *lopa (cf. tasya lopaḥ.* I. 3.9).

It will also be seen that though *ṇvi* is a termination (like several other terminations *viz. aṁ, aṇ* etc. laid down by

12. This division of the simple concept of loss, *viz.* the potent or strong loss and the impotent or weak loss, speaks for Pāṇini's mastery and originality in the analytical technique of language which even upto this day remains unparalleled.

Pāṇini), it leaves no trace of any of its three sounds in the formation *bhāk*. So also is the case with other terminations like *kvin, kvip* etc. which are totally lost and are inferrable only through the modification they cause in the formation. Pāṇini had to lay down these zero terminations also, because the termination is a 'compulsory category'[13] in Sanskrit language. Without it no form is usable in the language. In Pāṇini's analysis even the indeclinables take a termination which is afterwards elided; *cf.* 2.4.82 : *avyayād āpsupaḥ.*

Let us take the nom.plu. form of the nominal base *kati* (= 'how many') to illustrate the incapability of the zero caused by the word *luk*. The Pāṇinian grammatical procedure to arrive at the form is as follows :-

kati + jas (nom.plu.suffix according to 4.1.2)

= *kati + as* (*j* = 0 according to *cuṭū,* 1.3.7)

= *kati* + 0, as = 0 by the word *luk* according to the *sūtra, ṣaḍbhyo luk,* 7.1.22, since the word *kati* gets the *saṁjñā* (i.e. technical name) *ṣaṭ (according to the sūtras,* 1.1.23 and 1.1.25)

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13. *cf.* DR. S. S. BHAWE : *Pāṇini and lopa,* cyclostyled summary of a lecture given to the Pāṇini-students of the Summer School of Linguistics, Poona, 1960, (translated in Gujarati by DR. A. N. JANI : *Mañjūṣā,* 1961 p. 110, 111) in which he has discussed the zero-terminations *kvip, kvin, ṇvi, ṇvin,* and the *vikaraṇa ślu.* For termination as a 'compulsory category', *cf.* Patañjali on 1.2.45 *(arthavad adhātur apratyayaḥ prātipadikam) : pratyayena nityasaṁbandhāt nityasaṁbandhāv etāv arthau prakṛtiḥ pratyaya iti pratyayena nityasaṁbandhāt kevalasya prayogo na bhaviṣyati //*

= *kati.* accented as *káti*[14]

Here, since the nom. plu. suffix *jas* disappears by the word *luk,* the zero is incapable of bringing about any modification like *guṇa* and/or *vṛddhi* in the stem; and the nominal stem *kati* remains as it is. If the zero of *jas* would have been brought about by the word *lopa,* the nominal stem *kati* would have undergone the change of *guṇa* of the final *i* into *e* according to *sūtra, jasi ca,* 7.3.109; the *e* then would have changed to *ay* according to *eco'yavāyāvaḥ,* 6.1.78 and the form would have been *katay,* which is not the form used and accepted by the speakers of the language.

The same type of impotency exists in the zeroes laid down by the words *ślu* (given in 2.4.75 *juhotyādibhyaḥ śluḥ* for which *cf.* foot-note no. 12 above) and *lup* (given in 4.2.81 : *janapade lup).*

Besides the above categories of initial, middle and end-morphemes and sounds which amount to zero in grammatical operation, there are other categories, such as *ṭi* (defined by Pāṇini in 1.1.64), *bha* (defined in 1.4.18) etc. used by Pāṇini for technical and analytical purposes which also disappear under certain conditions.[15]

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14. This further supports the argument that Pāṇini was describing " an accented language " and that his rules, " are carefully framed keeping in mind among other things the final position of the accent in a given form " *cf.* DR. S. S. BHAWE : *Soma-hymns* of the *Ṛgveda,* part III, Baroda, 1962, p.104.

15. The category *ṭi* is sometimes a single sound (as in *rāma,* the final *a* being the *ṭi)* or sometimes attains the morphemic status (as in *manas,* the 'bit' *viz.* final *as* being the *ṭi).* The loss of *ṭi* as a morpheme is found in the word *mahimā,* from *mahat + imanic (cf.* 5.1.122 : *pṛthvyādibhya imanij vā),* the *ṭi viz. at* in *mahat* disappearing according to 6.4.155 *(teḥ.);* for the loss of *bha; cf.* the example *kāmaṇḍaleyaḥ* given by Bhattoji Dixita under 6.4.147 *(ḍhe lopo'kadrvāḥ).*

6. Zero of different categories :

The above discussion brings into foreground one important point; *viz.* in Pāṇini's grammar zero or loss of sound or sounds *(adarśanam)* is mainly of two types :(i) loss of sound or sounds which already exist in the stem, nominal or verbal, as in the case of √*daṁś* (the nasal *ṁ* going away in the form *daśati*[16]) and (ii) loss of sound or sounds which do not exist in the form but are applied to them for the sake of attaining symmetry in analytical technique, as in the case of the zero end morphemes *ṇvi, kvip, kvin* etc. To add these terminations, moreover, became necessary because, as Patañjali says, they are a 'compulsory category' in Sanskrit language. And under these circumstances, in spite of the criticism that "the description of a language becomes unduly sprinkled with zeros merely for the sake of structural congruence and balance"[17], Pāṇini, as a highly talented language - analyst, cound not but make use of zeros in his analytical technique, and in this light " the linguistic device of zero is justified only by the requirements of general statement."[18]

7. Pāṇini as a structuralist.

A note regarding Pāṇini as an analyst will, it is felt, not be out of place here, since the illustrations and analysis of formations given above lead us naturally to this next step. The examples in which the device of zero is employed by Pāṇini reveal him as a structuralist, because though he starts

16. The point as to why Pāṇini assumed originally the root as √*daṁś* and not √*daś*, though important, is out of the scope of the present paper.

17. cf. NIDA's statement quoted by PROF. W. S. ALLEN, *ibid* p. 110.

18. W. S. ALLEN, *ibid*, p.112.

with a minimum base (as in the case of roots; *cf.* his *Dhātupāṭha.)* his tendency is to expand it to the maximum and then reduce it to the form available in the language; *cf.* for example the desiderative form *śikṣati*. The procedure is :

R.[19]

= R.R.

= $R.R.S_1$

= $R.R.S_1.S_2$

= $O.R.S_1.S_2$

= $R.S_1.S_2$

So is the case with the form *abhūt*. While laying down the rules regarding the formation, he always compares the minimum forms against maximum available in the language. Without this basic comparison, no general rules covering maximum number of cases with minimum number of statements could have been framed. It will also be seen that this process of expanding the minimum (as assumed by Pāṇini) to the maximum and then by zeros arriving at the available form is more clearly visible on morphemic level.

But this is one side of the picture. The other side is where after laying down the rules for accounting the minimum forms, Pāṇini lays down the *āgamas* (i.e. additional sounds or morphemes) in order to accommodate the more expanded ones. This is the case, for example, in the pres. part. term. *āna* added to roots in the Ātmanepada. In this case, instead of starting from the more expanded

19. R = Root, S = Suffix.

-māna, he begins with -āna and then lays down the *āgama viz. muk i.e. m (cf.* 7.2.82 : *āne muk),* and we get *pacamāna* against *duhāna.* Instead, he could have easily started with *-māna* and gone to *-āna* with *m* = 0 before consonantal endings.[20]

The process of the comparison of the minimum with the maximum forms of the same class (pres. part. in the case of *duhāna* and *pacamāna)* can be illustrated by the following stages :

$$\frac{\textit{minimum}}{\textit{maximum}}$$

$$= \frac{\textit{duhāna}}{\textit{pacamāna}}$$

$$= \frac{\textit{duh + āna}}{\textit{paca + māna}}$$

$$= \frac{\textit{duh + o + āna}}{\textit{pac + a + māna}}$$

$$= \frac{\textit{duh + o + o. āna}}{\textit{pac + a + m + āna,}}$$

and at this stage we get the general formula as

$$\frac{\text{R } S_1 \; S_2 \; S_3}{\text{R } S_1 \; S_2 \; S_3}$$

It will now be clear that the *(ś)a(p)* and *m*(uk) which are inserted according to the Pāṇinian *sūtras* 3.1.68 *(kartari śap)* and 7.2.82 (quoted above) in the case of the form

20. What led him to assume the minimum in certain cases and maximum in other cases is a matter for investigation.

pacamāna are represented by zeros in the form *duhāna* and inversely the zeros in the form *duhāna* are represented by the infixes *(āgama) a* and *m* in *pacamāna.*

The general formula given above can be applied in the case of prefixes also and we can fix any two particular cases compared, in which *zero* or *āgama* (whether before or after the root) occurs, in the most general formula like the following :-

$$\frac{P_3\ P_2\ P_1\ \underline{R}\ S_1\ S_2\ S_3}{P_3\ P_2\ P_1\ R\ S_1\ S_2\ S_3}$$

(P = Prefix)

In mathematical language, this may be called 'the division' of the minimum by the maximum expanded form, or *vice versa,* and can be termed as 'linguistic division'. And if the numerator denotes the result, the formula will give out the possibility of inserting zeros in the minimum against the prefixes or suffixes of the maximum form.

If, however, the maximum is divided by the minimum, the result in the numerator will give out the prefixes or suffixes against the zeros in the minimum.

Thus it can be seen that the *āgama* and *lopa* are available by two different processes quite opposite to each other, since *lopa* is the absence of *āgama* and also *āgama* is the absence of *lopa.*[21] And in Pāṇini, we get a marvellous combination of these two approaches. Sometimes he

21. Like the famous pair of opposites, *viz.* Light and Darkness *(cf.* Sri Śaṁkarācārya's introduction to the Brahmasūtras : *tamaḥprākāśavad viruddhasvabhāvayoḥ)* of which, one's existence is the absence of the other.

'divides' minimum by maximum formation and sometimes maximum by minimum formation.

8. General Remarks

Now to turn to zero. All the above illustrations in which 'zero' can be said to occur can be classified under the following main five categories -

(1) Zero of simple sound or sounds which are neither 'linguistic elements' nor'class-indices.[22] Under this heading can be placed such examples as the *lopa* of the simple nasal *-ṁ-*in √*daṁś* or of the simple sounds *viz. -rj-* or- *at* - in the case of the form *jagarja* and the *saṁdhi paṭiti.* The loss of *-a-* of the reduplicated base *-pīpa-*in the form *apīpyat* (aor. caus. 3rd pers. sing of √*pā)* can also be classed here.

(2) Zero of what W. Haas calls as 'the linguistic element'. In this category can be included such examples as the zero of *apṛkta* sound *-v-* of the terminations *kvip, kvin, ṇvi* etc. or the zero of the *āgama -m-* in *duhāna* as contrasted with *pacamāna.* The disappearance of the word *duhitṛ* in the *dvandva*-compound *putrau* can also be classed under this category if the word *duhitṛ* is treated as a simple linguistic element; but if it is treated as representing the class of feminine according to 1.2.67 *(pumān striyā),* its disappearance can be taken as the zero of the 'class' viz. feminine gender;[23] similar is the case with the loss of the

22. For 'linguistic element' *cf.* W. HAAS *ibid.* p. 33 p. 1; also section 2; and for 'the class-index zero', *cf. ibid.* p.51 f; or, in general the whole section 3.

23. For the disappearance of the masculine gender in a *dvandva* compound of fem. and masc. *cf.* 1.2.66 *(strī puṁvac ca)* or 1.2.73 *(grāmyapaśusaṁghesv ataruṇeṣu strī).*

reduplicated base *-śi-* (in *śikṣati)* or *-ye-* (in *yete)* which can be treated on both the levels. So is the case with the loss of the terminations in the compounds. If the gen. termination *-sya-* in *paṇḍitasya* (compounded with *putraḥ)* is taken as a linguistic element, its zero in the compound *paṇḍitaputraḥ* would denote the zero of 'a linguistic element'; if *-sya-* is taken as disappearing on account of its representing the broader class of the *sup-terminations* (i.e. all the nominal declensional terminations) according to 2.4.71 *(supo dhātuprātipadikayoḥ* which lays down disapperance of all the *-sup-* terminations in a compound) its zero can be taken as a 'class zero'. Actually in some cases there is a very thin line of demarcation between 'the linguistic element' and 'the class index' in Pāṇini's grammar.

(3) The examples of the 'zero' of *(ś) a (p) (the vikaraṇa* of the 1st conj.) in the form *atti* (contrasted with *khādati)* or *duhāna* (contrasted with *pacamāna)* provide examples of a pure 'class index' amounting to 'zero'. The zero of *sic* inserted in the place of *cli* which denotes the aor. in the Parasmaipada, can also come under this category.

(4) The total loss of the 'zero terminations', as they are called, *viz. kvip, kvin* etc. is an example of the 'class index zero' in the sense that they denote a class of root-nouns and that they can be contrasted with other non-zero elements of the same class, such as the terminations *yuc* (i.e. *-ana-), nvul (i.e. aka), tṛn, tṛc* etc. which also are applied to form root-nouns. This group of zero terminations, however, deserves an independent category since they are applied on the principle of 'compulsory category' (though they disappear afterwards) which gives insight in Pāṇini's method of analysis. The indeclinables will

provide another example of this type which can be called as 'the zero of the compulsory category'.[24]

(5) Though the zero that is available by the *pūrvarūpa-ekādeśa* or *pararūpa-ekādeśa (cf.* the examples given) can be put under the zero of 'a linguistic element', it also deserves the recognition of an independent category on the simple ground that besides the express or implied statement of 'zero' *ekādeśa* can also be used as a novel technique for laying down 'zero'. We may call this as 'the zero by *ekādeśa'.*

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24. Perhaps, is not the assumption of 'a zero termination' in the case of 'sheep' (plu, Eng.) or 'cut' (past. Eng.) on the basis that *the plural or past must have a termination ? cf.* W. HAAS, *ibid* p.51,52.

II
The *It*-Zero

1. Introductory :

One of the most widely used, and hence favourite, techniques of Pāṇini is the *It-Saṁjñā i.e. the technical term called 'it'*. The term is entirely devoid of any linguistic or social signification[25]; it conveys a purely technical meaning in Pāṇini's grammar. The term *'it'* is the name or label of the sound which Pāṇini lays down as *'it'*. The conditions under which the sounds or even sound-groups are termed as *'it'* are well defined by Pāṇini himself in his grammar *(cf.* the *sūtras* 1.3.2-1.3.8 which are in all 7). The *it*-sounds are also called as *'anubandhas'* by later commentators and grammarians, though Pāṇini has used only the term *'it'* and not *'anubandha'*.

At the end of all these *sūtras* which lay down the conditions under which the different sounds or sound-groups should be taken as *'it'*, there comes one of

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25. The term *'it'* is derived from √i, *'to go'*, with the Pāṇinian zero-termination *kvip;* thus it would mean 'that which goes away'; *cf. Cāndravṛtti,* a commentary on the *Chāndra Sūtras,* on the *Cāndra Sūtra* 1.1.5 : *eti gacchati iti it/iṇaḥ kvip, tuk, etūti it/gacchati, na tiṣṭhati lupyata ity arthaḥ.* Jainendra and Śākatyana explain it as *aprayogī it* 'that which is not used in the language'. According to some scholers, *'it'* is *'iti'* itself with the final *i* of the latter lost; *cf.* G. B. PALSULE : *The Sanskrit Dhātupāṭhas - A Critical Study,* University of Poona, 1961, p.62. On the contrary, is it not more natural to say that *iti* is loc, sing of *it* with an accent on the final *i* as *íti (cf* Pāṇ. *sūtra,* 6.1.168) and with an accent-shift as *íti,* it would be turned into an *avyaya ?* Examples of regular declined words turning into an *avyaya* with an accent-shift are available in Veda; *cf. divā,* instr. sing. (ṚV 1.161.14 etc.) turning into an *avyaya* as *dívā* (ṚV 1.24.10,12).

the most important sūtras in Pāṇini's grammar which states the purpose of laying down all these *'it*-sounds'. The *sūtra* is *tasya lopaḥ,* 1.3.9; it lays down that the sounds or sound-groups which are termed as *'it'* under conditions specified in the sutras 1.3.2-1.3.8 disappear or amount to zero. Thus all the sounds or sound-groups which are termed as *'it'* in the preceding seven *sūtras* invariably amount to zero. Take, for example, the termination *ṣyañ* laid down by Pāṇini in the *sūtra* 4.1.78. As *ṣ* occupies the initial position of a termination, it will be termed as *'it'* according to the *sūtra, ṣaḥ pratyayasya,* 1.3.6, and will disappear according to *tasya lopaḥ,* 1.3.9; as the sound *ñ,* a consonant, occupies the final position of a termination, it will be called as *'it'* according to *sūtra, hal antyam,* 1.3.3, and is elided according to 1.3.9 quoted above. Now, the remaining sound-group *viz. -ya-* does not satisfy any condition of being *'it'* laid down in the *sūtras,* 1.3.2-1.3.8 and hence it does not amount to zero; it retains its form and existence.

The same is the case with the *it*-sounds in the *dhātus* or roots, *āgamas* or augments and *ādeśas* or replacing sounds or morphemes. Take, for example, the root √*sphūrj,* which is reconstructed by Pāṇini as *ṭuosphūrjā* (cf. Pāṇinian *dhātupāṭha, ṭuosphūrjā vajranirghoṣe)* and is accompanied by as many as three *it*- sounds, *viz. ṭu* (*it* according to *ādir ñiṭuḍavaḥ,* 1.3.5), 0 (*it* according to *upadeśe'j anunāsika* it. 1.3.2) and the final *ā* (*it* according to 1.3.2.). And since all of these are *it*-sounds, they amount to zero according to the *sūtra, tasya lopaḥ,* 1.3.9. What remains is only the bare root-norm √*sphūrj* to which the conjugational terminations should be applied.

We find that in Pāṇini's grammar different terminations, *dhātus,* or *āgamas* or *adeśas* are accompanied by different *it*-sounds. Not only this but also that the same termination or *dhātu* or *āgama* or *ādeśa* is found to have been accompanied by many *it*-sounds in different places and circumstances. Let us take the termination, say, *-ya-*which has a wide distribution in the sphere of the *taddhita, kṛdanta,* verbal conjugation and transformation. This single termination is reconstructed by Pāṇini with different *it*-sounds in different places. The different reconstructions of this termination are : *ṣyaṅ, ṣyañ, yak, yat, yaṅ, yañ, kyac, kyaṅ* and *kyap.* It will be seen that the same termination *-ya-* is accompanied by as many as 9 different *it*-sounds, viz. *ṣ.ś.ṅ.ñ.n.k.t.c.* and *p.* The same is the case with *dhātus.* Take the root √*mad* 'to be glad, to intoxicate' etc. It is reconstructed as *madi* (1st conjugation), *madī* (1st and 4th conjugations) and *mada* (10th conjugation), which gives us three *it*-sounds viz. *a, i* and *ī* accompanying √*mad.* The same is the case with the *āgamas* and *ādeśas.*

Just as we find the same termination or *dhātu* or *āgama* or *ādeśa* accompanied by different *it*-sounds, we also find the same *it*-sounds accompanying many terminations or *dhātus* or *āgamas* or *ādeśas.* Take, for example, the sound *c* which becomes *it* both in the initial as well as final position of a termination according to the *sūtras, cuṭū,* 1.3.7 and *hal antyam,* 1.3.3 respectively. The different terminations which have *c* as the *it*-sound are : *itac, ac, imanic, kānac, śānac, cānaś, khac, kyac* etc. So also with the *dhātus, gaml, śakl, vidl, mucl, sicl* etc. which have *l* as their *it*-sound. So with the *āgamas* and *ādeśas.*

This is rather a strange technique - to assume something

merely to negate it as soon as it makes its appeanance! To create something merely to destroy it as soon as it is created! The scope of the present chapter, therefore, is to examine the propriety and use of the Pāṇinian technique of *it-saṁjñā* or, it-zero as we may call it, in desecribing the Sanskrit language, to know the purpose which seems to have guided Pāṇini to introduce this technique.

2. Distinction between It-Zero and lingustic Zero :

Before going to discuss the problem proper, as posed in the scope of the paper, it is necessary to know the distinctive characteristics of the *it*-sounds amounting to zero. That is, in short the *it*-zero and other types of zero introduced by Pāṇini in his grammar. If one goes through Pāṇini's grammar, one will realise that there are circumstances which we have discussed before in which certain sounds or sound-groups or even entire morphemes disappear altogether. Take, for example, the *vikaraṇa śap* i.e. *a* added to roots in the first conjugation to form the *sārvadhātuka* forms in the active sense. This *vikaraṇa* amounts to zero in the case of roots in the second conjugation according to the *sūtra, adiprabhṛtibhyaḥ śapaḥ* 2.4.72 *(cf.* the forms *khādati* from √*khād,* 1st conjugation and *atti* from √*ad,* 2nd conjugation, both meaning 'to eat'). Thus, the sounds which amount to zero on account of being *it* appear to be on par with the sounds or morphemes such as *vikaraṇas* etc. which also amount to zero, even though the latter are not *it*-sounds, in so far as both of them disappear. And hence, the distinction between these two types of zero, *viz.* an *it*-zero and a non-*it* or linguistic zero appears to be of minor importance superficially. But this does not seem to be merely a verbal distinction between

it and non-*it* categories even though both of them disappear; the distinction has a deeper significance. While the latter *viz. vikaraṇas* etc. which are not *'it'* are linguistic entities in the sense that they are found even in forms other than those in which they disappear, the former *viz.* the *it*-sounds are extra-linguistic elements in the sense that they are absolutely nowhere available in any linguistic form or expression in usage. It is only in the preliminary stage of grammatical operation or what is called the *alaukika-vākya* (i.e. prelinguistic or technical stage of utterance) that the *it*-sounds are found; and as soon as that stage is over, we do not find them anywhere in any linguistic form or expression or what is called the *laukika-vākya* (i.e. utterance in linguistic stage, i.e. in usages) To clarify, in the above example of the termination *-ya-,* none of the *it*-sounds *viz. ṣ* or *ṅ* by which it is accompanied, is anywhere available in the form used in the language, that is, in the stage of *laukika-vākya.* As opposed to the disappearing *it*-sounds in the termination *-ya-,* the *vikaraṇa śap* i.e. *a,* which disappears in the *sārvadhātuka,* active forms of the roots in the second conjugation (cf. the form *atti),* is visible in the *sārvadhātuka,* active forms of the roots in the first conjugation (cf. the forms *khādati* or *bhavati* etc.) In other words, the pre-zero existence of the non-*it*-sounds or sound-groups amounting to zero is evident in cases other than those in which they disappear, whereas there is no pre-zero existence for the *it*-sounds in any linguistic expression or *laukika-vākya* in Sanskrit. Secondly, unlike the zero of the non-*it* sounds such as the *vikaraṇas* etc. the zero of the *it*-sounds cannot be contrasted against its non-zero in the linguistic expression in usage. The zero of the *it*-sounds, therefore, is a zero of a purely

extra-linguistic element; and to lay down something which does not come within the field of a science (here linguistics in general and grammar in particular), unless it is a part of a science or at least affects it from outside (like the para-linguistic categories of volume, voice, pitch etc. of the sounds) and then negate it, seems, therefore, to be a strange technique !

The *it*-sounds can also be compared with other *it* sounds which also amount to zero entirely and have also no pre-zero existence in similar forms in the language. Such *it* sounds or sound groups are the zero terminations or morphemes *ṇvi, kvip, kvin* etc. in Pāṇini's grammar applied to form root-nouns. These are purely zero-terminations in the sense that each of their sounds satisfies the conditions of being *'it'* and hence becomes zero. In this respect the zero-terminations are nothing but a bundle or combination of zeros. These zero-terminations also have no pre-zero existence in any usable linguistic expression in Sanskrit for which Pāṇini has laid them down. To explain, like the *it*-sounds, the termination *ṇvi* in the formation *bhāk* is also not available in its pre-zero stage either in this form or in any other usable forms of the same root-noun *viz. bhāk* used in the language. The same is the case with other zero-terminations like *kvip, kvin* etc. which are also not found in their pre-zero stage in any root-nouns usable in the language which are formed by applying these terminations. Just as the *it*-sounds are laid down and then elided, so also the zero-teminations are applied and then totally negated.

Secondly, just as the *it*-sounds have no non-zero counter-part, so also the zero terminations forming

root-nouns have also no non-zero counterpart. To illustrate, just as the zero *it*-sound *ṣ* occuring initially in a termination *(viz. ṣyaṅ;* see above) has no non-zero countrpart in any other *ṣ* satisfying the same conditions, a zero *kvip* also has no non-zero counterpart in any other *kvip* satisfying the same conditions as those of the former *kvip*. Just as there is no non-zero *it*, there is no non-zero *kvip, kvin* or *ṇvi* etc.

In spite of this similarity, there is a great difference between the two. In order to distinguish between the two, it is necessary to remember an important principle viz. that in Sanskrit language, and hence in Pāṇinian description, termination is a compulsory category; without a termination no form is usable in the language[26]. This assumption at once gives us the analysis of any form in Sanskrit into two categories : a *prakṛti* or *nucleus* and a *pratyaya* or termination or suffix. Thus any form in Sanskrit can be represented by the equation, Form = Nucleus + Suffix[27]. If now after analysis the formation *kartṛ* is seen to give out the nucleus *kar* and suffix *tṛ*, from the point of view of symmetrical description the formation *bhāk* must also be described or represented as giving out a nucleus and a suffix. But *bhāk* displays only the nucleus without any suffix. In such cases it becomes necessary for a grammarian to assume a zero-termination for the purposes of laying

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26. *cf.* Patañjali on 1.2.45 : *nityasaṁbandhāv etāv arthau prakṛtiḥ pratyaya iti. pratyayena nityasaṁbandhāt kevalasya prayogo na bhaviṣyati.*

27. For details, *cf.* M. D. PANDIT, *A Concordance of Vedic Compounds Interpreted by Veda*, CASS, University of Poona, Pune, 1989.

down general, symmetrical rules. Pāṇini has done exactly the same thing. The terminations in such cases are *kvip, kvin, ṇvi* etc. which are given arbitrarily and made to disappear entirely. In such cases though the phonological value of the terminations is zero, their value as terminations in on par with that of any other non-zero terminations. Though, therefore, the zero *kvip* cannot be compared or contrasted with a non-zero *kvip,* as a temination it can be contrasted with other non-zero terminations like *ṇvul, tṛc* etc. In this respct the zero *kvip* as a termination has its non-zero counter-part in terminations like *ṇvul, tṛc* etc. which do not amount to zero. The zero *it*-sounds, however, even as *it,* cannot be compared with other non-zero *it*-sounds, since obviously the division of a non-zero *it*-sound does not exist at all. Whatever is termed as *'it',* disappears entirely. A zero, *it ṣ,* therefore, as *it,* cannot be compared with a non-zero, *it ṣ* since obviously no non-zero, *it ṣ* is available. We thus find a definite grammatical principle behind the application and negation of the zero-terminations; no such grammatical or linguistic principle is visible in the application and negation of the *it*-sounds. Unlike the zero-terminations, the *it*-sounds are neither compulsory nor linguistic. Why then did Pāṇini introduce the extra-linguistic and non-compulsory *it*-sounds in linguistic description ?

3. Reasons for introducting this technique :

3.1 Necessity of linguistic description : One of the reasons for introducing the technique of *it-saṁjñā* could be sought within the Sanskrit language itself. The Sanskrit language, as is well known, is full of various types of formations. We find this variety especially in the field of

derivatives - both *taddhita* and *kṛdanta*. There are forms like *kártā* and *kartấ* which are similar phonologically but differ in accent; forms like *káraḥ* and *jayáḥ* take the same termination viz. *-a;* the roots therein, viz. √*kṛ* and √*ji* undergo the same grammatical change viz. *guṇa* of the vowels; yet they accent differently. It is clear from the formations above that though the terminations in the pairs are the same *(tā* in *kártā* and *kartấ* and *a* in *kára* and *jayá),* the forms on the whole, taken with the accent, do not present an identical appearance. So is the case with the pair *mṛga* and *mārga;* the termination viz. *-a* seems to be the same; the root from which both could be derived viz. √*mṛj* is the same. But, one form viz. *mārga* displays the *vṛddhi* of the vowel in the root, while the other form viz. *mṛga* does not. The same is the case with the formation *kṛtya* and *kārya.* Though both could be obviously derived from the same, homophonous root viz. √*kṛ* with the same, homophonous termination viz. *-ya,* they do not display a phonologically similar pattern. Take yet another pair as example. The formations *nartaka* (from √*nṛt* 'to dance') and *kāraka* (from √*kṛ* 'to do') display variations of grammatical change although they seem to take the same termination viz - *aka;* while the *ṛ* in √*nṛt* displays *guṇa*, the *ṛ* in √*kṛ* displays *vṛddhi.* Thus we find that though the termination is the same, it is not accompanied by the same grammatical, phonological or accentual change. Also, even though both the categories of two formations, viz. the *prakṛti* i.e. stem or nucleus and *pratyaya* i.e. termination or suffix are homophonous, the linguistic structures their combination gives rise to do not display homophonous statements; *cf.* the forms *mṛga* and *mārga; kṛtya* and *kārya.* Moreover, even if two linguistic structures going back to the

same, homophonous roots and the same, homophonous terminations are identical phonologically, they do not agree in accent; *cf.* the accented forms *kártā* and *kartā́*. Even the same termination bringing about similar grammatical changes in the stem and in the formation as a whole accents differently. Innumerable examples could be quoted in which the formations do not correspond either phonologically or accentually or both, even if the two categories of the *prakṛti* and *pratyaya* in the stage of their *prakṛti-pratyaya* analysis are the same.

Now, the problem for the grammarian under these circumstances is : How are such differences, which are sometimes very minute and subtle in the different formations in the language to be explained grammatically and comprehensively ? How is he to state the laws of the language in such a way that they would cover the maximum number of cases with minimum number of statements ? Or, should he, in such cases, abandon the formal approach and take to non-formal considerations if the latter are applicable ? There does appear some scope for explaining the formal categories with the help of non-formal categories like meaning etc. Take the pair *mṛga* and *mārga*. Should the grammarian explain these formations with the help of their meaning as : when the sense of 'deer' is intended, the derivative from *mṛj* with *a* should be formed without the *vṛddhi* of the vowel in the stem and when the sense of 'path, way, road' is to be conveyed, the derivative from √*mṛj* with *a* should get the *vṛddhi* of the vowel in the stem ? Innumerable cases like these could be cited in which there is a sufficient scope for the non-formal categories to come into the field of grammar. Is the grammarian justified in such

cases if he explains the formal categories with the help of the non-formal categories ?

Pāṇini has sought to overcome this difficulty with the help of the *it*-sounds. He attaches these sounds to the categories of terminations, dhātus, āgamas and *ādeśas,*[28] or in general, to whatever he deems fit or convenient. Actually there is no example of a termination or *dhātu* or *āgama* or *ādeśa* which is not accompanied by *it* sound or sounds. With the help of these sounds he distinguishes the apparently similar or homophonous terminations, *dhātus, āgamas* or *ādeśas* from one another. Thus for example, though the termination *-ya-* in the formations *kṛtya* and *kārya* is homophonous, it is reconstructed differently with different *it*-sounds. While the termination in *kṛtya* is reconstructed as *kyap,* accompanied by two *it*-sounds viz. *k* in the initial and *p* in the final position, the termination in *kārya* is *ṇyat* with an initial *ṇ* and a final *t* as *it*-sounds. So also in the case of the *dhātus* or *āgamas* or *ādeśas.* Thus the *it*-sounds primarily are meant to serve as differntiating agents or symbols.

But merely adding some *it*-sounds here and there does not solve the whole problem; it would merely differentiate the different terminations or *dhātus* or *āgamas* or *ādeśas,* and mere differentiation would not lead to the explanation of the formation. It would also not by itself be capable of suggesting the grammatical operation to be followed and the phonological modifications in the forms to be adopted. If

28. In all there are six grammatical categories in Pāṇini's grammar, which Patañjali calls as *vyavasita; cf.* Patañjali on 1.3.3 : ke punar vyavasitāḥ/ dhātuprātipadikapratyayanipātāgamādeśāḥ// cf. Appendix 1

symbols viz. the *it*-sounds are to be introduced with the aim to account chiefly for the difference in the formations, what is the use of such differntiating agents which cease to function beyond differentiating from one another the terminations or *dhātus* or *āgamas* or *ādeśas* only ? At this stage, such differentiating symbols require logically a positive, creative, operational capacity by which they will automatically operate and generate the formation. This would require special rules which would empower these differentiating symbols to operate, that is to say, to bring about the necessary phonological, accentual or any other type of modifications required to generate the desired formations. And this is exactly what Pāṇini has done. He has infused the *it*-sounds with different powers to bring about the required modifications in the grammatical process of the formation in question, laid down the rules and conditions, and specified the limit of the spheres in which they would exercise their powers.

Thus, we find that the *it*-sound *ṇ* in the termination *ṇyat* is invested with the power of bringing about the *vṛddhi* of the vowel in the stem; *cf.* the *sūtra, aco ñṇiti,* 7.2.115. This would give us phonological modification in the stem or base *kṛ* into *kār* (the vowel *ṛ* > *ār*) before the termination *ṇyat.* Also, the *it*-sound *t* would give us the svarita accent on the termination; *cf.* the *sūtra, tit svaritam,* 6.1.185. So is the case with all the *it*-sound attached to the terminations, *dhātus, āgamas* and *ādeśas.* The grammatical process according to Pāṇini to arrive at the two formations *kṛtya* and *kārya* is given below in detail for easy comprehension of the working of his whole technique :-

prakṛti (stem, nucleus) + *pratyaya* (termination, suffix)

= *rupa* (form).[29]

kṛ + kyap (kyap added according to 3.1.120)

= *kṛ + yap (k* is *it* and hence becomes zero according to 1.3.8 and 1.3.9 respectively)

= *kṛ + ya (p* is *it* and hence zero according to the *sūtras,* 1.3.3 & 1.3.9 respectively)

= *kṛ + t + ya (t* is inserted before the *pit*-termination according to the *sūtra, hrasvasya piti kṛti tuk,* 6.1.71)

= *kṛtya,* the final form (no *guṇa* or *vṛddhi* because of the *kit* termination, according to the *sūtra, gkṅiti ca,* 1.1.5)

Similar technique is to be followed in the case of the formation *kārya* also. The termination in this case is *ṇyat.* The procedure is as follows :-

prakṛti + pratyaya = rūpa (form)

= √*kṛ + ṇyat (ṇyat* added according to *ṛhalor ṇyat,* 3.1.124)

= *kṛ + yat (ṇ* is *it* and zero according to the *sūtras* 1.3.7 and 1.3.9 respectively)

= *kār + yat* (*ṛ* > *ār* accrording to 7.2.115 since the termination is *ṇit*)

= *kār + ya (t* is *it* and zero according to 1.3.3 and 1.3.9 respectively)

= *kārya,* the final form.

= *kāryà,* the accented, final form; since the termination is *tit, it* gets a *svarita* i.e. circumflex accent on itself

29. This is the basic assumption as Patañjali has explained in his *bhāṣya* on the Pāṇinian *sutra.* 1.2.45.

according to the *sūtra: tit svaritam,* 6.1.185; *cf* the form *kāryàḥ, Taitirīya Saṁhitā,* 3.5.2.1 etc.

We find, therefore, that though the forms *kṛtya* and *kārya* on straight, simple analysis into *prakṛti* and *pratyaya* apparently seem to possess the same, homophonous stem *kṛ* and the same homophonous termination *-ya,* they do not give out the same, homophonous formations. Pāṇini was, therefore, forced to show the difference between the formations with the help of the *it*-sounds attached to the termination viz. *-ya.* The terminations are differentiated at the very stage of their reconstruction; and the differentiating agents or symbols, viz. the *it*-sounds are invested with different powers to bring about the necessary phonological or accentual adjustments or modifications in the forms.

The same procedure and technique is to be adopted while accounting for the formations *mṛga* and *mārga, kártā* and *kartā́*, *nartaka* and *kāraka* etc. the homophonous terminations in whose cases are differently reconstructed by Pāṇini and infused with different powers with the help of the *it*-sounds. The same state of affairs prevails in the case of the *dhātus, āgamas* and *ādeśas.* The function ascribed to the *it*-sounds attached to the *āgamas* is to suggest the place where the *āgama* should be attached; *cf.* the *sūtras, ādyantau ṭakitau,* 1.1.46 and *mid aco'ntyāt paraḥ.* 1.1.47.

One, therefore, sees that the whole thing turns out to be the wonderful and systematic technique of the It- *saṁjñā.* The *it*-sounds perform two types of function : (1) If the terminations, *dhātus, āgamas* or *ādeśas* turn out homophonous after analysis, the *it*-sounds function as differentiating agents or symbols and (2) invariably they function as operational symbols, invested with the power

of operating within their specified field. Now, since, as we have seen above, they are extra-linguistic elements meant to serve a purely technical purpose, they must, strictly from logical point of view, be made to disappear from the scene as soon as their purpose is served. Thus, the zero of the *it*-sounds is a differentiating as well as operational zero. In the latter capacity, the zero has, like a magnet, a power to diffuse the different sounds either in the stem or termination or *āgamas* or *ādeśas* or all of them together and arrange all of them again in the desired order which will correspond to that in the linguistic expression used by the speakers of the language. The *it*-sounds in the capacity of operational symbols can thus be compared with the operational signs of addition, subtraction, multiplication, division and a host of other signs used in mathematics for the purpose of signifying or suggesting the desired mathematical operation between two or more numbers.

One can see, therefore, that the description of the Sanskrit language itself, which is full of various types of formations whose analysis into *prakṛti* and *pratyaya* turned out to be in many cases similar, partly demanded the use of such a complicated technique. Without such a technique, it would have been impossible to prepare in the briefest possible way the grammar of so rich a language as Sanskrit.[30] It is because of this inherent character of the language that Pāṇini found it necessary to introduce such a complicated technique.

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30. For the richness of the Sanskrit language from the point of view of the number of formations in it, *cf.* M. D. PANDIT, "A Statistical Picture of Pāṇinian Word- Formations" ABORI, 1978

3.2 Brevity : Besides the necessity of the language, there is yet another purpose in introducing this technique. At this stage, it would not be impertinent to ask : Why did Pāṇini choose to analyse and describe the language in the way he has done ? If, instead of analysing the form, say, *kṛtya* as *kṛ + ya* and then inserting a tagmeme *t* in between the stem and the termination, he had analysed it straight as *kṛ + tya,* the problem of distinguishing between the *-ya-*of *kṛtya* and of *kārya* would have been automatically solved. Certainly there is nothing wrong in this. To say that the formation *kṛtya* has a termination *-ya-* with a *t* is from common man's point of view the same as saying that it has a termination *-tya-*. True. But, such an analysis is quite all right in cases where definite phonological difference is visible in the terminations or stems themselves. And such cases are very few. Take the termination *-ya-* itself. One can easily distinguish it from *-tya.* But what about its difference from the passive termination *-ya-* (Pāṇinian *yak)* which is homophonous with *-ya-* in *kārya* and hence cannot be distinguished from it ? So is the case with the termination *-a*[31] as found in several forms like *jaya, kara, graha, grāha, bhava, bhāva,* etc. which, even if analysed in the non-Pāṇinian way, give out in all cases the same termination viz. *-a-* without any phonological variations in it. In such cases, there is no other way but to attach some arbitrary distinguishing signs or symbols to distinguish them from its other homophones. The only alternative to adding

31. The same *-a* is reconstructed by Pāṇini in as many as 18 ways : *a, ac, aṅ, ap, aṇ, ka, kap, khac, khal, khaś, gha, ghañ, ṭa, ṭak, ḍa, ṇa, ṇac* and *śa.* It is accompanied by as many as 12 *it*-sounds : *c, ṅ, p, ṇ, k, kh, gh, ñ, ṭ, ḍ, l* and *ś;* thus it is of twelve types, giving out twelve different phonological and accentual operations in the form.

distinguishing signs is to enumerate and enlist all those forms and terminations which display similar phonological pattern and change; that is to say, to put it in Pāṇinian terminology, to create a great number of groups or *gaṇapāṭhas;* in that case, it would be very difficult to lay down a general symmetrical rule and hence would be a *gaurava* as against *lāghava* or brevity which was thought as the most important thing, next to truth and accuracy, in scientific writings in ancient India. Brevity came to assume an important position in each and every writing because of the oral tradition in ancient India. It would have been impossible to hand down different texts orally without brevity.[32].

4. Reasons for introducing sounds of the language as symbols :

4.1 Artificial formal plane : It is really interesting to know why Pāṇini used the sounds of the Sanskrit language as operational or differentiating symbols. It is accepted that grammar restricts its scope to phonology, morphology and syntax of a language.[33] Therein too, a grammarian is concerned chiefly with the formal aspects of the linguistic expression and does not consider at all non-formal categories like meaning etc. Even if he has to consider the non-formal elements, he considers them secondarily i.e. through or with reference to formal elements.[34]. If, now, we read the technique of Pāṇinian *it-saṁjñā* from this

32. And hence the *sūtra-system* also.

33. *cf.* G. TRAGER : *Studies in Linguistics, 1958.*

34. cf. M. D. PANDIT, "Some Linguistic Principles in Pāṇini's Grammar", *Indian Linguistics, Linguistic Society of India. Deccan College, Poona 1963.* Vol. 24 pp. 53-56. *cf.* also, 'Formal and Non-Formal in Pāṇini', *ABORI,* Pune,1975.

point of view, we will find that by introducing the very sounds of the Sanskrit language as symbols, he has created in the technique itself an artificial formal i.e. meta-formal plane or level through which he not only lays down the purely formal i.e. grammatical procedures such as phonological variations and but even accounts for the supra-segmental categories such as accent and non-formal categories such as meaning etc. which would otherwise have required a purely non-formal approach. Pāṇini, who has dealt with the non-formal categories such as meaning etc. only through formal point of view, therefore, appears to be fully consistent in inventing and introducing the artificial formal level in his grammar. The result is that even if he considers the non-formal category of meaning in as many as 1000 *sūtras* and the suprasegmental accent in about 325 *sūtras,* he appears to be strictly adhering to formal analysis, so much so that the inclusion in his grammar of the non-formal nature of the technique and the discussion and description of the non-formal or supra-segmental category is not even easily recognizable. Without such a technique he could not have attained so much consistency and perfection in describing the formal categories. The example of the pair *mṛga* and *mārga, kártā* and *kartā́*, for the non-formal category of meaning, and the rules of accent for the supra-segmental category which are in many places explained only with reference to this artificial formal plane bear testimony to this.

It is with reference to this artificial formal level that he accounts for the formations in the language. Take, for example, the formation *nartakī,* feminine of *nartaka,* 'a dancer'. Actually the feminine form of the word *nartaka,*

which ends in *-a,* should be in Pāṇinian technique formed by applying the termination *ā* (i.e. *nartakā)* and not *ī* (i.e. *nartaki).* But by the virtue of this technique Pāṇini lays down the termination *ṣvun* to form the word *nartaka* (i.e. *vu* > *aka* according to *yuvor anākau)* in the *sūtra, śilpini ṣvun.* 3.1.145; then he lays down in the *sūtra, ṣid gaurādibhyaś ca* 4.1.41 that a form getting a *ṣit* termination gets the termination *ī* (Pāṇinian *ṅīṣ)* in the feminine. Now, because the termination *ṣvun* is *ṣit* i.e. has *ṣ* as the *it*-sound, the form *nartaka* which is formed by applying a *ṣit*-termination will give out its feminine as *nartaki* and not *nartakā.* In this case, he could have easily resorted to the non-causal meaning and explained the form, as opposed to the causal meaning of the form *kāraka* in which it is used in the language. Instead, he resorted to the artificial formal level, created by the *it*-sounds attached to the terminations.

In the case of the *it*-sounds of the roots also, Pāṇini has adopted the same technique. Take the *ṣit* root *jīṣ* 'to become old' (1st conj.) (i.e. √jī). Now Pāṇini in the *sūtra, ṣidbhidādibhyo' ṅ,* 3.3.104 states that a root which has the sound *ṣ* as *it* in his reconstruction gets the termination *a* while forming the feminine of its deriative. Thus, √*jī* gives out the non-feminine root-noun as *jaṛ;* this root noun gets one *a* (Pāṇinian *aṅ* in the *sūtra* 3.3.104) before a feminine termination and assumes the form *jara;* this *jara* being an *adanta* (i.e. ending in *-a)* gets the feminine termination *ā* (and not *ī*) according to the *sūtra, ajādyataṣ ṭāp,* 4.1.4 and gives out the feminine form as *jarā* which gets the declensional terminations. Instead of refering to the *it*-symbol *ṣ* he could have referred to the conjugation of the root which occurs also in the 9th and 10th conjugation

without any *it*.

The same is the case with accents also. Take, the form *kartā* both oxytone as well as barytone (discussed above). If the form is formed by applying the termination *tṛn* which is *nit, it will accent on the first syllable as kártā* according to the *sūtra, ñṇityādir nityam,* 6.1.197. If it is formed by applying the *cit*-termination viz. *tṛ*-c *(cf. ṇvultṛcau* 3.1.133), it will be accented on the last syllable as *kartā*. *cf.* the *sūtra, citaḥ,* 6.1.163. In this case, he could have easily resorted to the syntactic considerations of the words as : when syntactically connected with an acc. the word *kartā* would be accented on the first syllable as *kártā* and when connected with gen. it would be accented on the last syllable as *kartā̀*. But he resorted to the artificial formal plane of the *it*-sounds to explain it as formally as possible.

4.2 Oral tradition : It is well known that ancient India had oral tradition to hand down the material of the texts from generation to generation. It was obviously due to the fact that writing was either unknown or was not used for the purpose of handing down any text in those times. Now, when a person like Pāṇini wants to use some symbols in his text, obviously he has no other choice but to use only those symbols which could be handed down from one generation to another orally. And obviously as oral symbols, nothing is better than sounds. He could have used written signs similar to those that are used by mathematicians or logicians of today in their writing, if writing were used.

But it must be remembered here that all the sounds which Pāṇini has used to serve as operational or differentiating symbols occur there in the capacity of symbols and not as sounds or phonemes of the Sanskrit

language. And hence a clear distinction of a sound as a technical symbol and the same sound as the phoneme of the language must always be kept in mind while studying Pāṇini's grammar.

5. *It-* sounds added to terminations and to dhātus - A Comparison :

Now, by virtue of their being symbols, the *it*-sounds could be attached to anything according to convenience and occasion. Pāṇini on his part has employed them in four categories, viz. the teminations, the verbal stem i.e. the *dhātu*, the *āgama* and the *ādeśa*. In all there are six morphological categories in Pāṇini's grammar, which are called by the term *vyavasita* by Patañjali. Out of these, the *it*-sounds attached to the terminations on the one hand and to the *dhātus* on the other present an interesting contrast.

In the case of the terminations, the *it*-sounds employed are all from the group of consonants. Though theoretically according to the definition *hal antyam* 1.3.3 all the consonants can function as operational and differentiating symbols if they are added at the end of the termination, we get only 19 consonants used by Pāṇini to function as symbols. They are *k, kh, g, gh, ṅ, c, ñ, ṭ, ḍ, ṇ, t, n, p, m, r, l, ś, ṣ,* and *s;* and consequently to the minimum we have 19 types of operational and differentiating functions in the sphere of terminations alone. It will also be seen that the vocalic sounds as symbols are conspicuously absent in the case of terminations.

If we examine the Pāṇinian *dhātupāṭha* on the other hand, we find that the symbols used to suggest a grammatical operation are all from the group of vowels

which are ten in number; they are : *a, ā, i, ī, u, ū, e, o, ṛ,* and *ḷ*. In the spehere of *dhātus* Pāṇini has also used some consonantal sounds as symbols;they are in all six : *k, ṅ, ñ, ṭ, ṇ* and *p*. But we do not find any specific grammatical operation ascribed to them. These consonantal *it*-sounds mainly function as differentiating symbols.[35] Only the sounds *ṅ, ñ* and *p* function as operational symbols; *ṅ* suggests Ātmanepada; *cf.* the *sūtra* 1.3.12; *ñ* indicates that the root could be conjugated in both the *padas* viz. *Ātmanepada* and *Parasmaipada; cf.* the *sūtra*. 1.3.72; and the sound *p* performs the negative function of excluding the *pit* roots to assume the *ekārānta* form before the *kit* terminations of the potential and benedictive tenses; *cf.* the *sūtra, dādhā ghvadāp,* 1.1.20.

Another peculiarity of the *it*-sounds in the case of the *dhātus* is that in contrast to the invariably single-sound *it*-symbols in the case of the terminations, Pāṇini has also used double-sound *it*-symbols in the case of the *dhātus*; They are in all four : *ñi, ṭu, ḍu* and *ir*. What is meant by double-sound *it*-symbols is that unlike the sounds in the

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35. The *it*-sound *k* differentiates the root *i* (2nd conj.) 'to remember' from *i* (2nd conj.) 'to study'. The first is laid down as *ik* while the second is reconstructed as *in (cf.* also the roots ohāk and ohāṅ, 3rd conj.) The sound *ṅ* suggests Ātmanepada (*cf. annudāttaṅita ātmanepadam,* 1.3.12). The sound ñ indicates that the root can be conjugated in both the *padas* (*cf. svaritañitaḥ kartrabhiprāye kriyāphale,* 1.3.72). The sound *ṭ* attached as *it* to the root *dheṭ* (1st conj.) occurs only once *i.e.,* here and actually performs no function - neither of differentiation nor of any grammatical operation anywhere. The *it*-sound *ṇ* distinguishes between two homophonous roots; *cf.* the example of the roots *ik* and *iṇ* given above. So also does the *it*-sound *p,* which differentiates between the homophonous roots √*dā* 'to give' (1st conj. and √*dā* 'to cut' (2nd conj. par.). While the former is laid down as *dāṇ,* the latter is reconstructed as *dāp*.

single-sound *it*-symbols, the sounds in these double sound *it*-symbols disappear jointly and not singly or individually. They have a collective responsibility, so to say, in disappearing; *ñi* disappears as *ñi,* so that *ñi,* the whole, becomes zero; it does not disappear by parts as *ñ = 0* and *i = 0.* So is the case with the sounds in the symbols *ṭu, ḍu* and *ir.* To introduce a double-sound *it*-symbol is certainly a greater advance than the introduction of a mere single-sound *it*-symbol and opens a vast treasure of technical symbols for a grammarian, so that he will never fall short of symbols ! Unfortunately or fortunately, the occasion of coining three-sound or four-sound or multi-sound *it*-symbols did not arise for Pāṇini; otherwise he certainly would have gone to the extent of utilising multi-sound *it*-symbols for the sake of brevity and oral tradition !

Out of the four double-sound *it*-symbols mentioned above, the symbol *ir* poses a difficulty. While Pāṇini in the *sūtra, ādir ñiṭuḍavaḥ,* 1.3.5 carefully and explicity states the three symbols *ñi, ṭu* and *ḍu* as *it* and clearly lays down the initial position (cf. the word *ādih* in the *sūtra)* as the sole condition for them to be *it,* he has nowhere defined the symbol *ir* as *it* and stated the conditions when it is to be termed as *it.* It is only by implication from the Pāṇinian *sūtra, irito vā.* 3.1.57 that we are to understand that the sound-group *ir* is also to be counted as *it.* It is due to the absence of any Pāṇinian *sūtra* to that effect that the *vārttikakāra* had to frame his *vārttika,* viz. *ira itsaṁjñā vācyā (cf.* the *vārttika* on the Pāṇinian *sūtra,* 3.1.57). But even the *vārttikakāra* is also not sufficiently accurate on this point in that he has not clearly defined the positional

condition for the symbol *ir* to be *it*. And we are left to understand the final position of the symbol *ir* as the condition for its being *it* only from its occurrence at the final position of the roots. Fortunately, *ir* nowhere occurs in the initial position of any root and thus no ambiguity arises. In the case of *ir*, however, Pāṇini seems to have been a little careless.[36.]

In the field of *dhātupāṭha*, therefore, we have in all 20 *it*-symbols (10 vowels + 6 consonants + 4 double-sound *it*-symbols). Out of these, the symbol *a* is not ascribed any specific operational or differentiating function; the sounds *k*, *ṭ*. and *ṇ* do not perform the function of any grammatical operation. Excluding these four *it*-symbols, therefore, we have to the minimum only 16 types (20-4) of grammatical operations in the field of the *dhātus*, corresponding to the 16 *it*-symbols which are infused with a definite, positive function of grammatical operation. This fact, therefore, that only some, out of all *it*-symbols added to the *dhātus* perform the function of grammatical operation and the remaining either function merely as differentiating agents or even do not function at all in any way, is in sharp contrast with the fact that all the *it*-symbols added to the

36. This fact raises many problems. Is the *dhātupāṭha*, in which alone the *it*-symbol *ir* is available, Pāṇinian, pre-Pāṇinian or post-Pāṇinian ? In the first two cases Pāṇini could not have missed or neglected the point and been ordinarily careless. In the last case, Pāṇini could not have composed the *sūtra, irito vā* 3.1.57; and when it is there, its genuineness becomes a point of controversy and raises the further question : who added it and when ? There is yet another possibility. That Pāṇini knew, and laid down the operational purpose of the *it*-symbol *ir*, is clear from 3.1.57. Is it then possible that he had also composed a sūtra defining the conditions of the *it*-symbol ir, which was unfortunately lost in the course of oral tradition ? In that case Pāṇini could not be blamed.

terminations, *āgamas* and *ādeśas,* invariably and without any exception perform the function of grammatical operation,[37] besides acting as differentiating symbols.

All these *it*-symbols, therefore, in all give us 35 types (19 of the terminations and 16 of the *dhātus)* of grammatical operations in Pāṇini's grammar. Without the use of any such technique, Pāṇini would have been compelled to frame at least 35 more *sūtras.*

6. *It*-Zero - Always a potent or strong zero :

If one examines the linguistic zero introduced by Pāṇini in his grammar as a technique for generalisation and framing symmetrical rules, one finds that the linguistuc zero has two main divisions. The first is the potent or strong zero, which is laid down by the express term *lopa* and hence which has the power to bring about the stated grammatical changes in the process of generating the formations. The Pāṇinian *sūtra* that gives this power to the *lopa* is *pratyayalope pratyayalakṣaṇam.* 1.1.62. The second division is the impotent or weak zero, which is laid down by the terms *luk, ślu* and *lup (cf.* the *sūtra pratyayasya lukślulupaḥ,* 1.1.61) and hence cannot bring about any grammatical modifications in the grammatical process; the Pāṇinian *sūtra* that deprives the zero by terms *luk, ślu* and *lup* of such power is *na lumatāṅgasya* 1.1.63. In the case of the zero of the *it*-sounds, however, no such divisions into a potent

37. Does this fact not suggest that unlike the *it*-symbols added to the terminations, *āgamas* or *ādeśas,* some symbols added to the *dhātus* are loose and empty of any purpose? If this is so, then does it not point to the un-Pāṇinian authorship of the *dhātupāṭha ?* For a discussion of the authorship of the Pāṇinian *dhātupāṭha, cf.* G. B. PALSULE, ibid. ch. II.

zero and an impotent zero are available. The reasons are obvious. From the point of view of Pāṇinian technique and its terminology, we get that the zero of the *it*-sounds is laid down by the express term *lopa (cf.* the word *lopaḥ* in the *sūtra* : *tasya lopaḥ.* 1.3.9 which lays down the zero of the *it*-sounds). By the definition, therefore, given in the *sūtra* : *pratyayalope pratyayalakṣaṇam* 1.1.62, this *lopa* of the *it*-sounds has all the powers to bring about the stated grammatical changes. Moreover, there is no *sūtra* in Pāṇini's grammar which lays down the zero of the *it*-sounds by the terms *luk, ślu* and *lup.*

Secondly, from the point of view of the purpose which led Pāṇini to introduce the technique of *it-saṁjñā,* it would have been most illogical and unnatural to lay down the zero of the *it*-sounds by any terms other than the express term *lopa,* since obviously the technique of the *it*-zero is adopted only for the sake of bringing about the different grammatical operations in different places in as less a number of *sūtras* as possible. This very purpose, therefore, would not have been served if an *it*-sound would have been made to disappear by terms like *luk, ślu* and *lup* which leave the zero without any power to bring about any grammatical operations. The chief characteristic of the zero of the *it*-sounds is, therefore, that it is always and invariably a potent or strong zero with full authority to bring about the stated grammatical operations. There is no *it*-zero which is impotent or weak; nay, an *it*-zero can never be an impotent or weak zero if the purpose is, as we have seen above, what it is introduced for.

If, however, the categories of the terminations, *dhātus, āgamas* or *ādeśas* themselves, which the *it*-sounds

accompany, disappear by the terms *luk, ślu* and *lup* and hence become impotent, then alone the *it*-sounds become an impotent zero as in the case of the suffix *śap*. But in such cases, the *it*-sounds together with the terminations etc. they accompany have obviously no existence there and consequently no say in the matter of modifications. In all other places, the *it*-zero is a fully potent zero.

7. Types of functions of the It-Zero :

As we have seen above, all the *it*-sounds are seen to perform the two main functions of (1) differentiation and (2) grammatical operation. Each of the *it*-sounds performs either the first or the second or in many cases both the functions. Out of these two, the function of grammatical operation displays two divisions : (1) positive function (2) negative function.

7.1 Positive function : What is meant by positive function is that an *it*-sound positively brings about any phonological modifications like *guṇa, vṛddhi* etc. or any accent-change like *udātta, anudātta, svarita* etc. in the formation or stem or termination. The *it*-sound *ṇ* from the group of terminations is a good example. Its function as laid down by Pāṇini in the *sūtra, aco ñṇiti,* 7.2.115 is positive, viz. to bring about the *vṛddhi* of the final vowel in the stem. The example of the formation *kārya* (from √*kṛ* + the *ṇit* termination *ṇyat)* given above and the grammatical procedure shown there will illustrate the point. The *it*-sound *ṇ* positively exercises its power to bring about the grammatical change in the stem *kṛ* in terms of the *vṛddhi* of *ṛ* into *ār*.

7.2 Negative or neutral function : As opposed to the

positive function, the negative or neutral function in Pāṇini's grammar means the prohibition or nullification of the desired, positive grammatical operation, by means of an *it*-sound. The *it*-sounds in such cases are invested with negative or neutral capacity. Take the example of the *it*-sound *k* in the termination *kyap* applied to √*kṛ* to form the word *kṛtya*. We can see that by the Pāṇinian *sūtra, gkṅiti ca* 1.1.5 the *it*-sound *k* is invested with the power to prohibit any phonological change in terms of *guṇa* or *vṛddhi* in the stem. In other words, it nullifies or neutralises the operation of the *sūtra, sārvadhātukārdhadhātukayoḥ,* 7.3.84. Thus negation or prohibition and nullification go together.

Sometimes the same *it*-sound is found to perform both the positive and negative or neutral functions. Take the *it*-sound *p* in the termination *kyap* (in the form *kṛtya* above). The *p* has the positive function of inserting the tagmeme *t* before the termination *-ya-* according to the *sūtra hrasvasya piti kṛti tuk,* 6.1.71. The same *p* has again the negative function of prohibiting the *udātta* accent on itself; cf. the *sūtra* : *anudāttau suppitau.* 3.1.4 which prohibits a *pit* termination to have an *udātta* accent on itself. The *udātta* accent on a termination is laid down by Pāṇini in the *sūtras* : *pratyayaḥ.* 3.1.1 and *ādyudāttaś ca* 3.1.3. The *it*-sound *p,* therefore, simultaneously with the prohibition of *udātta* accent on itself neutralises the operation of the *sūtra* 3.1.3. It should be noted here that the spheres of positive and negative or neutral operations are different. While the sphere of positive function in the case of *p* is that of phonological change, the sphere in which it is ascribed a negative or neutral function is that of accent.

The same *it*-sound is - and can be - made to operate both positively and negatively in different spheres. There is no - and cannot be any - *it*-sound which functions both positively and negatively in the same sphere of grammatical operation.

There are some *it*-sounds like *ñ,ṇ,n* etc. which perform an exclusively positive function; no negative function is seen to have been ascribed to them anywhere. There are others like *g* etc. which perform an exclusively negative or neutral function; no positive function is seen to have been ascribed to them. There are also the *it*-sounds like *p* which perform both the positive and negative or neutral functions in different spheres.

8. The It-Zero in the Māheśvara Sūtras :

Besides the *it*-sounds studied above, we also find a different type of *it*-sounds which are not the product of the technical genius of Pāṇini and whose purpose is different from that of those discussed above. These are the *it*-sounds laid down in what are called the *Māheśvara Sūtras* which are in all fourteen and which enumerate all the phonemes of the Sanskrit language. The *it*-sounds in this case are all attached at the end of each of the *Māheśvara Sūtras.* They are in all 13 : *ṇ,k,ṅ,c,ṭ,m,ñ,ṣ,ś,v,y,r* and *l* of which the sound *ṇ* occurs in two places i.e. in the *sūtras aiuṇ* and *laṇ.* These sounds are not phonetically different from the regular phonemes of the Sanskrit language. Neither do they satisfy any phonetic or linguistic principle, nor do they help us in studying the arrangement either of the *Māheśvara sūtras* or of the Sanskrit phonemes therein. Since they all are repeated (all occur two times : in the middle of the *sūtras* as regular phonemes and at the end of the *sūtras;* the sound *ṇ* occurs

three times : in the *sūtras, aiuṇ, laṇ* and *ñamaṅaṇanam)* they do not satisfy even the primary principle of brevity. Why then are they included ?

Pāṇini, as a skilled technician, easily makes out the meaning in their inclusion and utilises them for a purpose. In the *sūtra, hal antyam,* 1.3.3, he terms all these final, consonantal sounds as *it* and in the *sūtra, ādir antyena sahêtā,* 1.7.71 he lays down a process by which one can form different sets or abbreviations of phonemes with the help of these final sounds. The *sūtra* 1.1.71 lays down that any non-*it*-sound in the *Māheśvara Sūtras,* taken with any of the following - and *not preceding* - *it*-sounds, would signify itself as well as all those sounds which come in between itself and the final sound.[38] And here we get what is called by the Sanskrit grammarians 'a *pratyāhāra'* (lit. an abbreviation)[39], a set, which could be made to signify all the sounds enclosd within the given limits. Thus, the initial, non-*it* phoneme *a* of the first *Māheśvara Sūtra, aiuṇ,* taken with any of the succeeding final, *it*-sound, say *c* or *ṭ* would make a *pratyāhāra* or set as *ac* or *aṭ* and would stand for all the sounds enclosed between the limits *a* and *c* or *ṭ*. Thus, the set *ac* encloses and signifies the sounds : *a,i,u,ṛ,ḷ,e,o, ai* and *au;* and the set *aṭ* encloses and signifies the sounds : *a,i,u,ṛ,ḷ,e,o,ai,au,h,y,v,* and *r.* But it must be remembered here that while counting the included sounds, all the *it*-sounds of the *sūtras* in between should be excluded. Thus, the set *ac* or *aṭ* does not signify the final

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38. *cf* BD on 1.1.71 : *antyenētā sahita ādir madhyagānāṁ svasya ca saṁjñā syāt.*

39. *cf. Kāśikā* on 1.1.71 : *pratyāhriyante samkṣipyante varṇāḥ yasmin.*

it-sounds viz. *ṇ,k,ṅ,c* and *ṭ* but includes only the non-*it* sounds, because, as they are termed as *it,* they amount to zero according to the Pāṇinian *sūtra*, *tasya lopaḥ,* 1.3.9, after they have served the purpose of set-formation.

The final, consonantal sounds of each of the *Māheśvara Sūtras,* therefore, which seem in the beginning as unnecessary and meaningless are now found to be of utmost necessity and full of meaning from the point of view of descriptive technique. These final sounds, termed as *it* and introduced for technical purposes, therefore, occur here in the capacity of extra-linguistic, technical symbols employed to facilitate the formation of different sets required in different grammatical circumstances and their zero is logically as necessary as that of all other extra-linguistic operational symbols discussed above. Pāṇini, therefore, lays down their zero in the *sūtra*, 1.3.9. The total number of *pratyāhāras* thus formed by combining the regular phonemes of the *Māheśvara Sūtras* with the 13 extra-linguistic *it*-sounds is 305, out of which only 40 sets have been used by Pāṇini in his grammar.

9. Sources Of The Pāṇinian It-Samjnā

We have seen that the author of the *Māheśvara Sūtras* has introduced different sounds at the end of each of the 14 *sūtras.* We have also seen that Pāṇini has also introduced many sounds as differentiating agents and operational symbols. Both types of sounds are called *it.* We also know that the *Māheśvara Sūtras* are prior to the Pāṇinian *Sūtras* which depend on the former for the technique of *pratyāhāra*-formation. All these facts, therefore, lead us to the obvious conclusion that Pāṇini found the clue for his technique of the *it*-saṁjñā in the *Māheśvara Sūtras.* The

difference between the *it*-sounds in the *Māheśvara Sūtras* and those introduced by Pāṇini is that while the function of the former is limited to the formation of the *pratyāhāras* or sets, the function of the latter is extended to a larger field viz. to suggest differentiation and grammatical operation. While the function of the former is always positive viz. to form the sets and never to de-form them, the function of the latter is both positive and negative, viz. to bring about or nullify a grammatical operation. While the former *it*-sounds are attached only at the end of the *sūtras,* the latter are attached to the begining, in the middle or at the end of the terminations, *dhātus* etc. according to convenience.[40] The only similarity between the *it*-sounds of the *Māheśvara Sūtras* and of Pāṇini is that they have a specific function to perform and as soon as they have served their purpose, they retire from the scene.

We do not know from where the *Māheśvara Sūtras* got the clue for employing such a technique, since no grammatical, technical or logical work prior to the times of the author of the Māheśvara Sūtras has come down to us. It is to be remembered here in this connection that the use of sounds as technical symbols or substitutes for numbers and unknown quantities is well known to mathematics; and the ancient Indian astronomers and mathematicians, including the comparatively modern astronomer Bhāskarācārya, have used sounds for mathematical numbers. Have they all got a clue from *Maheśvara* or

40. *cf.* the *dhātu ṭuośvi* 'to go, to grow, to increase' etc. where the *it*-sound *0* is in the middle; *cf.* the *dhātu olaḍi* in which the same 0 is in the initial position; *cf.* also the *dhātus, bhujo, rujo* etc. where the *it*-sound *0* is attached at the end of the *dhātus.*

Pāṇini ? Moreover, the technique which seems to be very simple in the *Māheśvara Sūtras* seems to have evolved into a highly complex and hence mature one in Pāṇini's grammar. Does this fact indicate a sufficiently long time-interval between the *Māheśvara Sūtras* and the Pāṇinian *Sūtras ?* This problem is discussed in full details in the chapter on the sources of *it*-zero.

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III

THE ANUVṚTTI-ZERO

1. There is yet another sphere in the grammar in which Pāṇini has very skilfully employed the technique of *lopa* or zero which has both semantically and formally a position. The peculiarity of the technique of zero in this sphere is that it is nowhere stated explicitly in clear terms nor is it implicitly suggested nor again is it stated to be amounting to zero indirectly, as in the case of the zero of *pūrvarūpa-ekādeśa,* or *pararūpa-ekādeśa* discussed before. Yet, one so easily and automatically takes the *lopa* of the categories concerned for granted that the zero employed in this technique goes totally unnoticed by the reader of the *sūtras*. The zero in this sphere does not relate to the sphere either of linguistic description, like the one which is a linguistic zero as in the case of *atti*, or of extra-linguistic technique, like the one in the case of the *it-saṁjñā*. The zero in this sphere relates solely to the field of the technique or principle of *sūtra*-arrangement.

As is well-known, one of the principles of the arrangement and interpretation of the *sūtras* in the *Aṣṭādhyāyī* is what traditionally goes by the name *anuvṛtti*[41], lit. following, pursuing etc. (from *anu* + √*vṛt),* that is, borrowing, carrying over etc. In simple language, if two *sūtras* have certain words/ conditions/ categories

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41. For *anuvṛtti, cf.* S. D. JOSHI and SAROJA BHATE, *The Fundamentals of Anuvṛtti,* CASS, University of Poona, Pune 1984. The book is nothing but a collection of all possible situations in the *Aṣṭādhyāyī* in which the principle of *anuvṛtti / maṇḍūkapluti* can be said to be present traditionally; it, howevere, does not spell out any 'fundamentals' of *anuvṛtti*-technique, as its tittle claims.

common between them, the succeeding *sūtra* drops out or does not repeat the common words of the preceding *sūtra* and yet the common words are to be automatically taken to be present in the succeding *sūtra*. To illustrate, let us take the two *sūtras, upadeśe aj anunāsika it,* 1.3.2. and *hal antyam,* 1.3.3. While interpreting the succeeding *sūtra hal antyam,* 1.3.3, the words *upadeśe* and *it* from 1.3.2 are to be taken as being present in it and the *sūtra* 1.3.3, when expanded by reading the two words will read - *upadeśe hal antyam it.* While writing the grammar Pāṇini includes the common words *upadeśe* and *it* in the preceding 1.3.2 but drops them out in the succeeding 1.3.3. This device is employed sheerly out of the consideration for axiomatic brevity in the *sūtra* arrangement; the brevity thus achieved by this technique is *alpākṣaratva,* 'having less number of letters or sounds'.[42]

Viewed from the point of view of a comparison of wording of the two *sūtras*, this technique of dropping out the common words from the succeeding *sūtras*, yet at the same time, making readers believe their presence in the same, amount indirectly to the zeroing of the words, or in other words, employing indirectly the technique of zero of common elements. This device is similar to the device of taking out common factors in the factorisation-process in mathematics.

2. Let us now study the technique of *anuvṛtti* in greater detail.

Let us take, as an example the *sūtras* 1.3.2.-1.3.8, in

42. *cf.* the definition of a *sūtra* as : *alpākṣaraṁ asaṁdigdham sāravad viśvatomukham astobham anavadyam ca sūtram sūtravido viduḥ*

all seven, laying down the *it*-sounds and the conditions for the sounds to be *it*. The following is the Pāṇinian statement and order of the *sūtras* which are quoted here for easier and clear understanding :-

(a) Pāṇinian statement :

1. *upadeśe ac anunāsika it,* 1.3.2.
2. *hal antyam,* 1.3.3
3. *na vibhaktau tusmāḥ,* 1.3.4
4. *ādir ñiṭuḍavaḥ,* 1.3.5
5. *ṣaḥ pratyayasya,* 1.3.6
6. *cuṭū,* 1.3.7
7. *laśakvataddhite,* 1.3.8

All of these lay down the different conditions for the various sounds to be *it; sūtra* No. 3, viz. 1.3.4, however, prohibits certain sounds to be *it* under certain conditions.

If we read the *sūtras*, we find that except the one, single *sūtra*, viz. 1.3.2. which contains the words *upadeśe* and *it*, all the rest do not have any such words; yet, we have to borrow these words in consistently interpreting the rest of the *sūtras*. While *sūtras* No. 2, 3 and 4 *viz.* 1.3.3, 1.3.4 and 1.3.5 require the *anuvṛtti* of two terms *viz. unadeśe, it, sūtra* No. 5, *viz.* 1.3.6, *ṣaḥ pratyayasya,* requires the *anuvṛtti* of *upadeśe it* (from the first *sūtra* i.e. 1.3.2) and *ādiḥ* (from the forth *sūtra* i.e. 1.3.5) ; *sūtras* No. 6 and 7, viz. 1.3.7 and 1.3.8 on the other hand are meaningless without the *anuvṛtti* of four terms viz. *upadeśe, it, ādiḥ* and *pratyayasya* (the last from the fifth *sūtra* i.e. 1.3.6). Not only this, but also that the absence of *anuvṛtti* of these terms in places where they are required will create chaos and upset the whole Pāṇinian *sūtra*-system ; its absence will hinder

any intelligent interpretation of the *sūtras*, will create technical and grammatical difficulties and further lead to interpretational deadlocks, affecting the grammar of the language. The importance of *anuvṛtti* in the Pāṇinian principles of axiomatics can, therefore, hardly be exaggerated.

We know, therefore, that many times and in many places in Pāṇini's *sūtra*-system, we have to read many *sūtras* by assuming the existence of certain words even if they are not there. This assumption of their existence there is based upon their actual inclusion in some preceding *sūtra* or *sūtras*. If, therefore, in the above example, we put the borrowed words in the places in which they are required but are not there, we may perhaps get a clue as to the underlying principle of *anuvṛtti*. The Pāṇinian statements in their solved form will then be :-

(b) Solved Pāṇinian statements :

1 *upadeśe ac anunāsika it,* 1.3.2

2 *upadeśe hal antyam it,* 1.3.3

3 *upadeśe na vibhaktau tusmā it,* 1.3.4

4 *upadeśe ādir ñiṭuḍavaḥ it,* 1.3.5

5 *upadeśe ādiḥ ṣaḥ pratyayasya it,* 1.3.6

6 *upadeśe ādiḥ cuṭū pratyayasya it,* 1.3.7

7 *upadeśe ādiḥ laśakvataddhite pratyayasya it,* 1.3.8

The dissolved form of the Pāṇinian statements at once now helps us to decipher the principle on which the technique of *anuvṛtti* seems to be employed. We can easily see that the words, which are required to be borrowed are common words in all or some of the Pāṇinian statements. In other words, what Pāṇini did is that he took out all the

common words occuring in all the *sūtras* and inserted them in one single *sūtra* which would stand at the head of all its dependent *sūtras*. The concept underlying the principle of *anuvṛtti* is, therefore, purely mathematical, *viz.* that of taking out of the brackets the highest common factor from amongst the given, numerous algebraic expressions. The Pāṇinian statement of rules, therefore, looks like bracketted algebraic or mathematical expressions with the highest common factor or factors out of the brackets. The point will be clear if we put symbols for all the words and rewrite the *sūtras* symbolically.

Put *a* for the words *ac anunāsikaḥ*

b for the words *hal antyam*

c for the words *na vibhaktau tusmāḥ*

d for the word *ñiṭuḍavaḥ*

e for the word *ṣaḥ*

f for the word *cuṭū*

Put *g* for the word *laśakvataddhite* -

x for the word *upadeśe*

y for the word *it*

p for the word *ādiḥ*

q for the word *pratyayasya*

and the sign + (plus) for showing the Pāṇinian order of *sūtras*.

We now represent the Pāṇinian statements symbolically as :

x.a.y + x.b.y + x.c.y + x.p.d.y + x.p.e.q.y + x.p.f.q.y + x.p.g.q.y.

Taking out the highest common factor viz. *xy* out of

the brackets, we get,

xy (a+b+c+p.d+p.e.q.+p.f.q.+p.g.q)

We can again take out some more common factors and we get the factorised expression as :

xy[a+b+c+p{d+q(e+f+g)}] which is the perfect alegbraic representation of the Pāṇinian statement of the seven *sūtras*. While the factors *xy* are common to all of the *sūtras* (and hence they are taken out of the biggest brackets), the factors *p* and *q* are only partially common to some of the *sūtras*.

The principle followed by Pāṇini in employing the technique of *anuvṛtti* in his *sūtra*-system, therefore, seems to be similar to the simple principle of factorisation or finding out the highest common factor from amongst the given expressions in algebra. The highest common factor taken out may be a single word or group of many words.

There are many examples in Pāṇini's grammar in which the technique of *anuvṛtti* is employed. The scope of the *anuvṛtti* varies from two to a number of *sūtras*; *cf.* the *sūtras* 3.2.95 and 3.2.96 where the *anuvṛtti* of the word *yudhikṛñaḥ* is limited only to the two *sūtras*, whereas the *anuvṛtti* of the word *ṭac* extends upto 22 *sūtras* from 5.4.91 - 5.4.112; while the *anuvṛtti* of the word *dhātoḥ* in the *sūtra*, 3.1.91 covers almost one, entire *adhyāya* (viz. the 3rd) of four *pādas* containing in all 541 *sūtras*, the *anuvṛtti* of the word *prātipadikāt* in the *sūtra* 4.1.1. embraces in all 1190 *sūtras* from two complete *adhyāyas* (viz. 4th and 5th) of four *pādas* each.

The *anuvṛtta* word can either be the subject or what is technically called in Indian grammars as *uddeśya* or predicate or what is called as *vidheya*. The *anurvṛtta* word

it in the above example belongs to the grammatical category of *vidheya* or predicate while the word *upadeśe* belongs to the category of *uddeśya.*[43].

3. Types of *anuvṛtti* :

If we examine all the examples wherever *anuvṛtti* is to be resorted to for the interpretation of the *sūtras*, we find three different, broad types :

(1) formal *anuvṛtti* (2) semantic *anuvṛtti* and (3) semi-formal or semi-semantic *anuvṛtti.*

3.1 Formal *anuvṛtti* :

This type is visible in cases in which only the form of the word is to be borrowed; the *anuvṛtta* word there does not refer to any meaning, social or technical. This is the case where the suffixes or *pratyayas* in their form are to be borrowed; *cf.* the *sūtras* 5.4.91-5.4.92 where the word *taC* in the *sūtra* 5.4.91, which is a termination, is to be borrowed in its own form in interpreting all the rest of the *sūtras*; the word *taC* does not refer to any linguistic or technical meaning in this context. It is pure *śabdānuvṛtti* i.e. borrowing of the form of the word.

3.2 Semantic *anuvṛtti* :

There are circumstances where the linguistic meaning conveyed by the words used in the *sūtra* has to be borrowed in interpreting the following *sūtras*; *cf.* for example the *sūtra, tasyāpatyam,* 4.1.92. Neither the word *tasya* nor the word *apatya* is to be borrowed; what is borrowed in the following *sūtras* is the linguistic meaning that the phrase

43. It is to be noted in this connection that according to the Indian Sanskrit grammarians, any category other than *vidheya* is to be included in the category of *uddeśya;* and hence *upadeśe* belongs to the category of *uddeśya* and not to that of *vidheyavistāra* i.e. extension of predicate.

tasya apatyam ('his / her child / progency') conveys. The same is the case with the *sūtras, tatra jātaḥ,* 4.3.25, *tatra bhavaḥ,* 4.3.53 etc.

Actually *Kāśikā* on the *sūtra*, 4.1.92 remarks : *arthanirdeśo'yam* ('this is a reference to the meaning' and not to the form of the words *tasyāpatyam).* This type of *anuvṛtti* is purely on the semantic plane; it is pure *arthānuvṛtti.*

3.3 Semi-formal or semi-semantic *anuvṛtti* :

This category is seen where Pāṇini intends a technical term like *prātipadika, dhātu* or *aṅga* to be borrowed in the following *sūtra*. The result is that mere physical borrowing of the technical term, say *prātipadika* (in the *sūtra*, 4.1.1), does not work or suffice, since in actual grammatical operation, we have to take into consideration some concrete *pratipadika* like *rāma* or *hari* or *bhānu* which would satisfy the criterion of being a *prātipadika* laid down in the definition (*cf.* the *sūtras*, 1.2.45;46). That is to say, a technical term requires that it must be borrowed both physically or formally as well as semantically. This type of *anuvṛtti* is both formal as well as semantic; also, it is neither purely formal nor purely semantic. We may term this type as semi-formal or semi-semantic.

The whole discussion above aims to bring into foreground one important point, viz. that to take out 'only the semantic import' or 'meaning' of the words, detached of their formal counter-parts, as the common factor is certainly a stage further than taking out 'simply the pure form' of the words as the common element. In the case of the pure semantic *anuvṛtti*, Pāṇini seems to have transcended the limits of formal plane. He thus seems to

repudiate the claim that algebraic, or in general symbolic representation is possible only in the case of formal - and not semantic - categories. And no one would deny that this is certainly a great advance in analytical technique and symbolic representation if only one takes into account the context of time in which Pāṇini flourished. The technique would have certainly paved way for the development of symbolic logic if it had been pursued by the later grammarians and scholars in different sciences.

We can represent algebraically those *sūtras* also in which semantic *anuvṛtti* is available by ascribing suitable symbols to the semantic categories.

The whole technique of *anuvṛtti* can, therefore, be said to have been based on the same principle on which the technique of factorisation or finding out the highest common factor in algebra is based.

4. Other instances :

The same technique of factorisation or taking out the highest common factor is clearly visible in the definition of *prātipadika* laid down by Pāṇini in the *sūtra, arthavad adhātur apratyayaḥ prātipadikam.* 1.2.45.

5. Another point of view.

The method of factorisation shown above as being adopted by Pāṇini as the basis of the *anuvṛtti*-technique is one way of looking at it. There is yet another way in which we can arrange the *sūtras* in terms of categories and not words which brings out clearly the use of indirect zero in the technique. It is as in the following. In all there are seven categories in the *anuvṛtti*-technique adopted in the case of the *it-saṁjñā sūtras* :-

Technical condition	sounds which are *it*	phonological condition	morphological condition	positional condition	negation	result	sūtra no.
upadeśe	*ac*	anunāsika	—	—	—	*it*	1.3.2
O	*hal*	—	—	*antyam*	—	O	1.3.3
O	*tusmāḥ*	—	*vibhaktau*	O	*na*	O	1.3.4
O	ñiṭuḍavaḥ	—	—	*ādiḥ*	—	O	1.3.5
O	*ṣaḥ*	—	*pratyayasya*	O	—	O	1.3.6
O	*cuṭū*	—	O	O	—	O	1.3.7
O	*laśaku*	—	*O and ataddhite*	*O*	—	*O*	*1.3.8*

Table No. 1

The categories or elements which are to be carried over in the succeeding *sūtras*, are dropped out by Pāṇini; in other words, they are zeroed, hence they are represented by zero in the above Table No.1. The entities which are not to be carried over in the following *sūtras* are represented simply by a horizontal dash.

It will be clear from the above way of writing the *sūtras* that what Pāṇini does in adopting the technique of *anuvṛtti* is that the first statement (in this case the *sūtra*, 1.3.2) from which he starts employing the technique is extended to or contains maximum number of categories or terms and then by eliminating or eliding the common terms which need not be repeated he frames the wording of the succeding *sūtras*. In this case also, as in the case of the linguistic zero discussed before, he starts with maximum expanded form of the *sūtras* and then goes to the minimum statements. In the present case also, the first *sūtra* no. 1.3.2 viz. *upadeśe aj anunāsika it* contains four, that is, maximum categories which are explicitly stated in the *sūtra*. The *sūtra*, 1.3.7 viz *cuṭū* contains only one category, viz. of the sounds which are entitled to be *it*-sounds. All other categories are taken for granted. It will also be clear that out of the 49 cells (7 columns and 7 rows), Pāṇini has used the zero in as many as 18 cells of categories, 16 cells are completely vacant and only 15 cells are filled up with positive categories. The zero-cells thus form a majority number in this case.

Lopa or zero as an *ādeśa*

The zero of linguistic categories like the *śap*-zero in the second conjugation and the zero of the categories in the *sūtras* like the above in the case of *anuvṛtti*-technique bring into foreground one important point, viz. that this type of

zero is not an absolute negation or vaccum, that is, *abhāva*, but stands for something which is already mentioned previously. Thus, the zero of *śap* in the second conjugation stands for the *śap*; the zero of the different categories in the present case of the *anuvṛtti*-technique stands for the categories concerned. In other words, *lopa* or zero is a substitute for the categories, because though the categories are dropped from statements, framed later, they do exist in absentia in the statements; they are to be read in the place of zero. They do not totally disappear from the scene; they are understood to be present; they appear again at the time of reading the *sūtras* from which they are dropped. The zero is thus on par with any other substitutes in Pāṇini's grammar. To exemplify, let us take the example of √as being substituted by √*bhū* in the *ārdhadhātuka* conjugations according to the *sūtra, aster bhūḥ,* 2.4.52. The process is :-

as + ta (i.e. *kta,* an *ārdhadhātuka* past pass. part. suffix)

= *bhu + ta (as* substituted by *bhū)*

= *bhūta.*

In this example, though *as* is totally dropped out, that is, in a way, zeroed, the root *bhū* takes its place. Similarly, in the case of *śap*- zero, though *śap* is lost or *disappears from the scene, its existence is needed for the application of the sārvadhātuka* suffixes. In this sense, the *luk* or zero of *śap* is a substitute or *ādeśa* for *śap* . So also in the case of the zero of the different categories in the above, or for that matter in any, situation of the *anuvṛtti*-technique, the zero of the categories which are dropped out stands for the categories because we have to read them indirectly while interpreting the *sūtras*. Patañjali is very right when he says

that *lopa* is an *ādeśa*; *cf.* Patañjali on the *sūtra, pratyayalope pratyalakṣaṇam,* 1.1.62: *lopo' py ādeśaḥ. katham ? ādiśyate yaḥ sa ādeśaḥ lopo'py ādiśyate. doṣaḥ khalv api syād yadi lopo nādeśaḥ syāt.* Thus from the reasoning of the zero adopted here and from the point of view of Patañjali, the categories which are zeroed are the *sthānin* and zero is the substitute or *ādeśa*.

6. Linguistic Zero and Extra-linguistic or *it*-zero :-

The above discussion, supported by Patañjali's remarks, does not, however, mean that every zero, whether linguistic or extra-linguistic, is an *ādeśa*. That zero is an *ādeśa* for some *sthānin* holds good in the case in which either a linguistic category or any category in the *anuvṛtti*-technique is involved; it does not hold good in the case of the extra-linguistic *it*-sounds. The reason is obvious. The technique of *it-saṁjñā,* as we have seen before, is introduced only for the sake of bringing about certain grammatical operations and modifications; the *it*-sounds in this context are only differentiating or operational symbols or markers. In this capacity they only indicate the grammatical operations. Neither the *it*-sounds nor the grammatical operations they indicate are the mutual substitutes of each other. The extra-linguistic *it*-sounds indicate the grammatical operations not because they are zeroed but because they are invested with those powerś. True that they exercise their power even after they are zeroed, but the powers invested in them are not their substitutes.[44]

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44. *cf.* Patañjali on the *sūtra,* 1.1.62 : *pratyayo lakṣaṇam yasya kāryasya tallupte'pi bhavatīti... iha lupte pratyaye sarvāṇi pratyayāśrayāṇi kāryāni paryavapannāni bhavanti; tāny etena praty utthāpyante.*

To illustrate, let us take the example of the *it*-sounds *ṇ* in the suffix *aṇ,* stated in the *sūtra, karmaṇy aṇ,* 3.2.1. The procedure to arrive at a form like *kāra* from √*kṛ* with the suffix *aṇ* is as follows :-

kṛ + aṇ

= *kṛ + a (ṇ=o)*

= *kār + a (vṛddhi* of *ṛ* into *ār,* according to 7.2.115)

= *kāra*

What is actually substituted here is *ār,* for the sound *ṛ* and not the zero of the *it*-sound *ṇ;* the *it*-sound is only an indicator or marker of the fact that the sound *ṛ* be substituted by *ār,* its *vṛddhi*-grade. The same is the case with all the *it*-sounds employd by Pāṇini. In the case of the zero of linguistic categories and others, however, the zero actually occupies the place of the categories which are dropped out; the formations or *sūtras* thus framed cannot be interpreted without assuming the categories which are zeroed. The zero in this case has a positional value.

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IV

THE LINGUISTIC ZERO—SOURCE OF

1. We have seen in the foregoing pages the employment of the technique of *lopa* or zero by Pāṇini in his *Aṣṭādhyāyī* and practically exhaustively examined all the circumstances where zero can be said to occur. We have mainly *three* spheres, in which zero can be said to have been employed.

The first sphere pertains to the linguistic/grammatical description of the forms proper. The zero in this spehre occurs in the formative process itself which is stated by Pāṇini and is to be followed in arriving at the form. The illustrations are the verbal forms *khādati/atti* or the *kṛdanta*-formations like *bhāk* (from √*bhaj)* with zero suffixes or the nominal forms like *marut* (nom. sing. of *marut)* etc. The pecularity of this zero in this formative process is that given the Pāṇinian technique, we cannot arrive at the form without encountering a situation in which zero can be avoided. We call this zero as 'the proper Linguistic Zero'.

The second sphere in which zero is employed relates to the grammatical operations to be resorted to in arriving at the form. As is obvious, a nominal or verbal base to reach to the state of a final, finished form has to undergo different morphological modifications in the formative process. These modifications are indicated, not by straight, flat rules, but by resorting to the technique of *it-saṁjñā* in which the *it*-sounds, well-defined, are used as indicators or symbols of the grammatical operations or modifications required. The sounds being extra-linguistic are then made to disppear as soon as their function as indicator is over. We call this

zero as '*it*-zero'. This zero performs the function from an artificial formal plane which bridges the gulf between the formal categories such as the bases and the non-formal statements about grammatical operations/modifications and thus creates an impression that the Pāṇinian system is purely formal.

In both the above two spheres Pāṇini explicitly states the zeroing of the categories or sounds in independent *sūtras*.

The third sphere in which the technique of zero can be said to have been adopted by Pāṇini concerns with the sphere of *sūtra*-arragement. While arranging the *sūtras*, Pāṇini drops the common elements of the previous *sūtras* and makes us believe their presence in the succeeding *sūtras*. In effect this technique of dropping the elements required in the succeeding *sūtras* amounts to their zeroing. Read from this point of view, the technique is nothing but an employment of a sort of zero-technique indirectly. This type of zero is nowhere stated by Pāṇini in explicit terms but is left to be understood. He does not explain or define the technique of *anuvṛtti* anywhere. This shows that the technique was all well-known to the then scientific world. We call this zero as 'zero in *anuvṛtti*' or briefly as '*anuvṛtti-zero*'. This zero is in the sphere of axiomatics.

All these three techniques of zero are employed for the sake attaining brevity in statements, so that a maximum number of cases can be covered up by minimum numbr of statements.

But we are still in the dark about the origin or sources from which Pāṇini has borrowed this technique of zero. In

the following is an attempt to hint at some conjectures which may be the possible sources for this technique.

2. The Linguistic Zero - An Analysis of the Fromative Process -

If we examine all the circumstances in which the linguistic zero occurs (i.e. zero of a linguistic category which occurs in other cases) and analyse the formative processes as stated by Pāṇini, we arrive at two basic principles on which the technique of linguistic zero seems to have been based.

2.1 Structural Approach :

We find in each of the circumstances that Pāṇini starts his process of description of the concerned forms with the formation which has maximum - or, at least greater - number of terms and then by gradually eliminating one by one goes to account the minimum forms which have the least number of terms. Thus in the examples of *khādati* and *atti* we have two forms in question, with *khadati,* assumed as having greater i.e. three number of terms and *atti,* assumed as having less i.e. two number of terms. The process is :

khādati = *khād+a+ti* = $R+S_1+S_2$, and

atti = *ad+a+ti* = $R+S_1+S_2$.

Thus, Pāṇini, first brings the two forms on the same level as containing three terms. But *atti,* in the form in which it is used in the language, does not contain a three-morpheme structure. Hence it becomes necessary for Pāṇini to eliminate the unrequired term which is the *vikaraṇa śap* i.e. *a* in this case; and we have,

atti = *ad+a+ti* = $R+S_1+S_2$.

= *ad+O+ti* = $R+ 0 +S_2 = R.S_2$.

The same is the case with the forms *śikṣate* etc. dealt with before. This process is based on grammatical assumption that a conjugated verbal form must contain a *vikaraṇa,* and consequently technically must contain a three-morpheme structure, $R+S_1+S_2$.

If on the other hand we analyse the formative process of the nominal formations like *marut* or the indeclinable *śanaiḥ,* we find that the basic assumption underlying this process is that a declined form, to whichever category it may belong, whether noun or indeclinable, must also be accompanied by the termination of declension *(sup)* and consequently be of a two-morpheme structure R+S.

If we analyse the formative process of the *kṛ*-formation *bhāk* (from √ *bhaj),* we find that, besides the declensional termination even the *kṛt* suffix *ṇvi* is assumed as existing and then elided. So also with the *taddhita*-formation, *pañcakapālaḥ, (=pañcasu kapāleṣu saṁskṛtaḥ puroḍāśaḥ)* which contains the *taddhita*-suffix *aṇ* which is afterwards elided according to the *sūtra, dvigor lug anapatye,* 4.1.88. The assumptions behind these two processes is that the formations, to be formations of the said type viz. *kṛdanta* and *taddhita,* must contain the concerned suffixes.

So also in the case of the *ekaśeṣa dvandva* compound like *bhrātarau (=bhrātā ca svasā ca),* which to be eligible to be called a dvandva compound must initially contain two *prātipadikas* connected by the relation *ca,* one of which is afterwards elided.

In all these examples above, in which the zero of a

linguistic entity is employed, we find that Pāṇini, from a logical and scientific point of view, is absolutely right in assuming the concerned suffixes, because the form concerned will not be recognised as such if the suffix of the concerned sphere is not attached to it. A language may contain forms which may be homophonous and hence formally identical like, say, *bhava* (imper.2nd sing.) and *bhava* (lord *Śiva)* in the language; but it is the duty of the grammarian to see that the forms are properly recognised and explained as such at least in or through the formative process. In other words, Pāṇini is very careful to see that the different suffixes get their proper places in the formative process of the forms, though not in the fully-finished forms used and usable in the language.

Thus in all the examples like *khādati/atti, kartā/bhāk, pāñcakapālaka/pañcakapāla,. svasṛbhrātarau/bhrātarau* etc. the latter minima are explained with reference to the former maxima and the relevant categories in the minima are zeroed. Not only this, the zeroed categories have their reserved positions in the formative processes. And it must also be noted, as we have observed earlier, that zero can occur only in the process from maximum to minimum and never in one from minimum to maximum, since obviously, in the latter alternative, the minimum has only to gain and nothing to lose. This fact and principle clearly establishes that Pāṇini is basically a structuralist in the sense that he is analying the language from the point of view of maximum structures. This analysis is invariably structural in all the cases in which he has used the zero-technique.

2.2 Positional Analysis

It will be seen that in all the above examples the suffixes

of the concerned transformations are first assumed and then elided in cases where they are not found in the language. Such an assumption in final analysis implies, first, a basic comparison of all the forms of one group and secondly the positional analysis of the forms based on comparison to facilitate or find out one-to-one correspondence of one form with the other. Thus the form *atti* is first compared with the form *khādati,* which is the starting point, and then a search for finding out the one-to-one correspondence of the terms of both is carried out. In such a positional analysis and correspondence, the *śap* i.e. *a* of *khādati* seems missing in *atti;* the *śap* is, therefore, represented positionally by *lopa* or zero in *atti.* The assumption of a category and then its zeroing implies that even though the category is not seen *(a-darśana),* it has its own reserved position in the formative process. This presupposes that Pāṇinion formative processes are all based on positional analysis of the language. This is clear from the analysis of the formative process given above, as well as from the Pāṇinian statements like *pratyayaḥ,* 3.1.1, *paraś ca,* 3.1.2, as regards the *pratyaya* (which includes all types of *pratyayas* like *taddhita, kṛdanta, vikaraṇa,* the *sup,* the *tiṅ* and the feminine) which is applied *after* the base or *prakṛti; cf* also the *sūtras* like *ādyantau ṭakitau,* 1.1.46 (referring to the initial and final position), *mid aco'ntyāt paraḥ,* 1.1.47 (referring to the position posterior to the last vowel in the base), *tasminniti nirdiṣṭe pūrvasya,* 1.1.66 (referring to the prior), *tasmād ity uttarasya,* 1.1.67 (referring to the latter), *alo'ntyasya,* 1.1.52 and *ñic ca,* 1.1.53 (referring to the final), *ādeḥ parasya,* 1.1.54 (referring to the initial) etc. in which the positions of the *pratyayas* to be applied are clearly defined. For the word 'position', Pāṇini uses the

word *sthāna, cf.* the *sūtra, ṣaṣṭhī sthāneyogā,* 1.1.49, and *sthānivad ādeśo'nalvidhau,* 1.1.56, in both of which the word *sthāna* is specifically used; it means 'place, position' and not *'prasaṅga'* (= occasion) as BD. and *Kāśikā* would have it.[45]. Even the word *prasaṅga* means 'the position' in final analysis; because otherwise the words *ādi, antya, pūrva, para,* or the word *sthānin* (if it is rendered as *'prasaṅgin')* will convey no intelligible meaning in positional analysis. It is on the basis of the meaning of *sthāna* as 'position or place' that Patañjali treats the zero also as an *ādeśa* for some *sthānin* suffix.

Not only this. That the starting point of Pāṇini's analysis of the Sanskrit language is positional analysis is also clear from the fact that in treating the non-formal categories like time or tense, gender, number etc. he prescribes definite positions to them as represented by the suffixes; *cf.* for example, the treatment of the tense, say, present, 3rd sing, of √*khād.* His procedure is :

khād + vartamāna i.e. pres. tense,

khād + l (=laṭ, which represents the pres. according to *vartamāne laṭ,* 3.2.123; *cf.* BD : *vartamānakṛiyāvṛtter dhātoḥ laṭ syāt; a* and *ṭ* are zeroed : *aṭāvitau.)*

= *khād + ti (= tip,* which represents the pres. 3rd pers. sing. termination, according to 3.4.77 and 3.4.78 and which replaces *l* of *laṭ;* any of the pres. tense terminations can replace *laṭ;* it depends upon volition of the speaker).

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45. cf. BD : on the *sūtra, sthānaṁ ca prasaṅgaḥ, cf.* also Kāśikā, *sthānaśabdaḥ prasaṅgavācī;* Kāśikā cites an example from ritual context, viz. *darbhāṇam sthāne śaraiḥ prastaritavyam,* which is out of context and hence irrelevant. But basically *sthāna* and *prasaṅga* are identical.

= *khād + a (=śap) + ti*

= *khādati.*

We can, therefore, see how intelligently Pāṇini has attempted to include in his formal analysis based on positional considerations even the non-formal category of time or tense.[46]. Again, it is to be noted that the terminations *tip* etc. representing the time or tenses are mere substitutes i.e. *ādeśas* for the *lakāras* i.e. *laṭ* etc. (which in turn are an *ādeśa* for present tense) and not *sthānin,* which fact renders their position only secondary, the primary position being of the *sthānin laṭ.*[47]. So also is the case with other non-formal categories like gender and number, which also reside in the suffixes and hence are positionally treated. All these facts drive us to the conclusion that Pāṇini's linguistic analysis is based on positional considerations of the *prakṛti, pratyaya, vikaraṇa, āgama* etc. And the technique of *ādeśa*, which includes zero also, cannot be made an exception to this. From another point of view also, the *lopa* or zero is an *ādeśa*. If the categories which our zeroed are replaced by other categories, the latter are treated as the *ādeśa* of the former. Thus, the *śap* i.e. *a* of the first conjugation is replaced by *śyan* i.e. *ya* (4th conj.), *śnu* i.e., *nu* (5th conj.), *śa* (6th conj.), *nā* (7th conj.), *u* (8th conj.) and *śnam* i.e. *na* (9th conj.) and all these replacements are treated as substitutes of the basic *śap*. Why not then treat the *luk* and

46. For details, *cf.* M. D. PANDIT, 'Formal and Non-Fromal in Pāṇini', ABORI, 1975.

47. *ādeśas* are always secondary as compared with *sthānin;* for an intelligent discussion on this point, *cf.* SERGIU AL-GEORGE, 'The Semiosis of Zero according to Pāṇini', *East and West,* Vol. 17, No. 1-2, Rome, pp. 115-124; esp. p.116 f. 1967.

ślu of the 2nd and 3rd conj. respectively as *ādeśa* or substitute, though in final analysis it amounts to zero ? *cf.* Patañjali on Pāṇini 1.1.62 : *lopo'py ādeśaḥ. katham ? ādiśyate yaḥ sa ādeśaḥ. lopo'py ādiśyate. doṣaḥ khalv api syād yadi lopo nādeśaḥ syāt.*

3. Positional Analysis in Pāṇini and Mathematics

Pāṇini's technique of positional analysis of linguistic entities has a very great resemblance with that found in mathematics. Mathematics was in a sufficiently developed stage in ancient India in Pāṇini's times. The numbers and their positional reading and study was very well known right from the times of the Ṛgveda, the ancient-most literature of the world. The whole Vedic mathemaitcs accepted the basis ten as the first base which was the starting point for two-digital representation. And it is unbelieveable that Pāṇini, an intelligent grammarian, did not know the mathematical technique. Of course, one must admit that there is no direct evidence to suggest knowledge of mathematics or borrowing from mathematics on Pāṇini's part. But the points of similarity between mathematics and Pāṇini's grammar can hardly be overlooked.[48] Let us illustrate the point with some examples.

The Pāṇinian rule *pratyayaḥ,* 3.1.1 states that *pratyayas* referring generally to *sup* and *tiṅ pratyayas* always occupy the posterior - or, to be correct, most

48. for more examples of points of similarity between Pāṇini and Mathematics, *cf.* J. F. STAAL, *'Euclid and Pāṇini', Philosophy East and West,* XV.2, April 1965, pp. 99-116; *cf.* also M. D. PANDIT,'Mathematical Representation of Some Pāṇinian *Sūtras',* JUP, 1967; also 'Pāṇini va Gaṇitaśāstra' (in Marathi), Shete Felicitation Volume, Pune, 1971.

posterior, that is, final - positions, posterior to the *prakṛti.* In other words, this means that the *sup* and *tiṅ pratyayas* close the form and nothing is or can be added after it. This statement about the position of the *pratyayas* immediately distinguishes them from the *āgamas* which are or can be applied to the *prakṛti* anywhere, either in the initial, middle or final (but before the *pratyayas)* position. Thus, speaking only from the point of view of position, we can immediately distinguish the different *a* in the form *agachat;* both the initial and the penultimate *a* can never be *pratyayas,* since on account of its final position, the final *t* seems to be the *pratyaya.* In other words, we can distinguish the identical sound *a* merely by position. Though all *a* are the same, they do not enjoy the same value based on position.

Coming to mathematics, we meet with the same principle. In the mathematical number 11, the number 1 occupying the initial and last positions is the same. Yet, both the numbers, though identical numerically, carry or signify different values based on position.

Similarly, when in mathematics a certain place in a number has no number at all, the place, though vacant, is represented by the symbol zero, as for example, in the number 102 or 120. The first has no number in the decimal place and the second in the digital place. Yet, the places are reserved and are indicated by the symbol zero. Such a denotation of the place by the symbol zero is necessitated by requirements of scientific symmetry.

The same is the case in Pāṇini. Although the form *atti* has a vacant place in its surface structure, it is assumed to have third place of the *vikaraṇa śap* in between the *prakṛti* and the *pratyaya* at the level of deep structure or

grammatical description. This is necessitated by the fact that a form *khādati* of the same group displays no vacant place at both of its levels, viz. the surface structure as well as the deep structure or grammatical description. It is, therefore, thought more profitable, scientific and symmetrical to start with a form whose behaviour is consistent at both the levels. The result of this procedure is that the form, like *atti*, which shows discrepancy at the two levels, has to lose one term from its deep-structure-formula, to account for the surface structure-form. Thus,

khādati: the surface structure = *khād+a+ti*; the deep structure: which is $R+S_1+S_2$; but

atti, the surface structure = R+S, is not identical with deep structure, $R+S_1+S_2$. The S_1 from it is, therefore, zeroed, indicating the vacant place of the *vikaraṇa*.

In all this process, a basic comparison between two forms is implied. In situations like the above in which one of the compared forms (say, *atti*, called B, the other being call A), shows inconsistent behaviour at the two levels, we have the following three alternatives open for description :-

i. to describe A with reference to or in comparison with B, or

ii. to describe B with reference to or in comparison with A, or

iii. to describe both independently of each other.

The third alternative obviously is just unscientific and entails *gaurava*, especially when the number of cases involved in description is very great. Out of the remaining alternatives, the second one is briefer and more scientific.

Pāṇini very rightly selected the second one.

This brings into foreground one of the very important aspect of Pāṇinian technique of grammatical description. Pāṇini tries to go deep to a level at which the deep structures of all the entities he wants to describe can be fitted in a single formula which may serve as the starting point for the description of all - or, at least large number of - the cases. Of course, this is not the only method Pāṇini adopts invariably. He sometimes, as we will see later, adopts a different technique also. And the type of the technique to be adopted is again based on statistical considerations. The technique, which can cover the largest number of cases is taken to be the most preferrable starting point from the point of view of brevity, comprehensiveness and convenience.

In the process of starting from the common deep structure for the relevant forms and coming to the various types of surface structures, Pāṇini has to omit the elements which are not available in the surface structures but which are assumed to be in the deep structure. Thus, because the deep structure of

khādati = *khād+a+ti* = $R+S_1+S_2$.

the deep structure of *atti* also should be

atti = *ad+a+ti* = $R+S_1+S_2$. But *a* is not available at the surface structure of *atti*, hence,

atti = *ad*+a+ti = $R+S_1+S_2$

= *ad+a+ti* - *a* = $R+S_1+S_2-S_1$.

Such a method of addition and subtraction is many times used in mathematics in order to bring the given

expression in line with the general formula of solution. Thus, to illustrate, take the mathematical expression $a^4 + 64b^4$ for factorisation. This expression does not fit in any general formula for factorisation; what is, therefore, done is to add a suitable term like $+16a^2 b^2$, and the expression takes the form $a^4 + 16a^2 b^2 + 64b^4$.

But this expression is not identical with the original. The term $16 a^2 b^2$ is, therefore, subtracted from it and the expression looks like,

$$a^4+16 a^2 b^2 + 64 b^4 - 16a^2b^2,$$

which now fits in the general formula of factorisation of difference of two squares; and the factors are -

$$(a^2+4ab+8b^2) (a^2-4ab+8b^2)$$

This exactly is what Pāṇini has done in the case of *ad+a+ti-a* in particular and in all other case of linguistic zero in general. The form *atti* corresponds to the original mathematical expression, viz. a^4+64b^4.

In expanding *ad+ti* to *ad+śap+ti,* what Pāṇini seems to be aiming at is to bring the two-term expression *atti* to the level of a three-term expression *khādati,* because both the expressions belong to the category of the conjugated verbal forms. He could have divided all the *dhātus* into two separate categories, viz. (i) those with *vikaraṇas* and (ii) those without *vikaraṇas*, and described the forms accordingly. But such a method would have assumed two categories of *dhātus* instead of one, which would have entailed a *gaurava,* as against *lāghava,* from technical point of view, and it would have been perhaps rejected in preference to the former method. Assuming a single-structure formula of three terms like $R+S_1+S_2$ for all

the conjugated verbal forms obviously brings a natural symmetry in linguistic description, which is the most coveted principle in any scientific writing.

This method of description assures of greater brevity in the long run than the other one, viz. to describe A, the maximum, with a reference to or in comparision with B, the minimum. In this method of description, from minimum to maximum, there will be always only additions which are termed as *'āgamas'* in Pāṇini's grammar in every case and never any subtractions. The possibility of subtractions, that is zeroes, is offered only in the description from maximum to minimum.

This technique of zero is thus basically and purely a technical device born out of necessity for brevity and symmetry of linguistic description and nothing else. As L BLOOMFIELD puts it,[49] "The Hindus hit upon the apparently artificial but in practice eminently serviceable device of speaking of a zero element." To see in this technique, as S. AL GEORGE does,[50] an attempt on the part of Pāṇini to base his grammar on the principle of a sort of "ontological abstraction" and "conceiving the general, as having a richer comprehension than the subordinate individuals" is, from a purely technical point of view, to see too much in a grammatical work like Pāṇini's *Aṣṭādhyāyī,* whose aim is to describe a language and not to spell out any philosophy of language; the only technical principle that Pāṇini might have and has actually used is the principle of zero, perhaps borrowed from positional mathematics.

The sweeping observation regarding the principle of

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49. *cf.* L. BOOMFIELD *Language,* London, 1961, 13.2.

50. *cf.* S. AL GEORGE, *ibid.* p.119

"ontological abstraction" and "conceiving the general, as having a richer comprehension" falls down if we examine the technique of *āgamas* adopted by Pāṇini in which the starting point of description consists of minimum elements with reference to which the "richer" elements are explained. Thus, *kṛ+ya(cf.* 3.1.97 = *aco yat)* = *kṛ+t+ya (t=tuk* according to 6.1.71 : *hrasvasya piti kṛti tuk)* = *kṛtya.* In this case, the basic position, viz. *kṛ+ya,* if that is what is meant by "general", is not richer than the "subordinate" *kṛtya,* if "subordinate" means not a point of start, but the point of finish.

The description of the conjugated form also starts with the assumption of the minimum *dhātu*-base to which the additions of *pratyayas, vikaraṇas* and *āgamas* are carried out.

It will be seen, therefore, that Pāṇini starts with a richer comprehension only in some cases and not all. His basic assumption viz. the usable form is composed of a *prakṛti* and *pratyaya* is born out of the fact that he starts the linguistic analysis from the forms usable in the language and not from some artificially assumed bases. His grammar is generative; but the approach is structural in some cases and not all. It will be seen, therefore, that to use this or that technique for linguistic description depends not on any philosophy but is a matter of symmetry, convenience, brevity and statistical considerations. Pāṇini is not at all stead-fast about using only this or that method. He strikes a balance betwen the two. AL-GEORGE's observation, therefore, viz. "the fact that Pāṇini employs this ontological abstraction in describing word structure is in accordance

with the earliest Indian ontology[51] is only partially true, only in cases where Pāṇini starts his description from a more expanded structure to explain a less expanded one.

A point about the fields of the use of *lopa* or zero (i.e. substraction) and of *āgama* (addition) is worth-noting. If we examine the situations in which Pāṇini has used the technique of zero, we find that majority of the categories which are zeroed are meaningful units i.e. morphemes. They convey some meaning, either linguistic or grammatical.

There are, however, certain exceptions to this, especially in the field of *saṁdhi* (cf. 8.2.23; 3.19; 4.64 etc.) in which only sounds which convey no meaning are zeroed. But the exceptions are very few. And we have in general the meaningful morphemes like *śap, ṇvi* etc. becoming zero.

Out of the four basic mathematical operations, viz. addition, subtraction, multiplication and division, only the operation of subtraction provides a situation in which we encounter with zero i.e. an emptiness. Thus, in subtracting 2 from 5 i.e. in 5-2, we get 3, but in subtracting 5 from 5 i.e. in 5-5, we get nothing i.e. zero. In general terms, $x-y=\pm z$, but $x-x=0$. Hence zero is smaller than any positive number.

In Pāṇinian analysis also, zero is available only in the process of subtraction. Sometimes a part is subtracted, as in the imperf. 3rd pers. sing. *akhādat* in which the termination *ti* loses its final *i* and amounts to *t;* thus, *ti-i=t (cf.* the *sūtra, itaś ca,* 3.4.100); sometimes the whole is subtracted, as in *atti*, the *śap.* thus, *ad+śap+ti-śap.* When

51. AL-GEOREGE, *ibid.* p.119

the whole is subtracted, we get the Pāṇinian technique of zero of linguistic categories.

The process to arrive at zero adopted by Pāṇini is thus on par with the one of mathematics.

This is about how zero comes into picture in the mathematical and Pāṇinian procedures.

As regards its function, as we have already seen, the zero functions as an indicator of the empty space in mathematics and also in Pāṇini grammar.

In mathematics, the concept zero is used in two ways - (i) as a number as in numbers 0,1,2,3 etc. and (ii) as a value of a variable.[52] As a number, with which we are generally concerned, it is "an immediate predecessor" of the positive number 1. The positional system of number integer notation required a special marker of the empty, non-occupied position for the sake of greater clarity. The Pāṇinian zero is comparable to the first type viz. zero used as a marker of an empty, non-occupied space or position. Thus in mathematics we have, after the number nine, the number ten, which in numerical symbol, is written as 10, the zero here showing an empty, unoccupied position.

But the problem here is : What unoccupied or empty position does the zero in the figure 10 indicate ? The natural answer is : of course, it indicates the position of the single digit, as opposed to the number 1 which occupies the

52. *cf.* HANS HADEMACHER and EMIL GROSSWALD, *Encyclopaedia of Science and Technology*, Vol.14, 1977, p. 698; cf. also PEANO, *Gruntlagen der Mathematik*, Ch. I; *cf.* also COHEN, and EHRLITH, *Structure of Real Number-Systems;* also HARDY and WRIGHT, *Number Theory*, Cambridge University Press, Cambridge.

decimal position. But again the difficulty is — we start from single-digit numbers 0,1,2,3 ... and come upto 9. And at least so far as these nine numbers are concerned, there is no unoccupied, empty position in any of them, since obviously they are single-digit numbers. Does it mean that the number 10 is derived, not from its immediate predecessor 9 by an addition of 1, but from its immediate successor 11, by a subtraction of 1 ? In that case, the process completely tallies with that given by Pāṇini in introducing the technique of zero. Just as Pāṇini starts with a category which has greater elements, to account for another category which has less elements, similarly, did mathematics start with a number which has the richest comprehension (like infinity) and then come down to the final number 1 and then to zero ? It is only this process of going from maximum to minimum which alone can account for the zero in mathematics also. Any other process will never give out zero at all to indicate an empty, unoccupied position. Emptiness or what Naiyyāyikas call *abhāva* (lit. non-existence) can never be a category or concept which can be grasped in absolute conditions; cf. the definition of *abhāva,* as *bhāvapratiyogitvam.*

The Naiyyāyikas totally reject the possibility of the knowledge of *atyantābhava (=atyanta + abhāva),* absolute emptiness or non-existence. The definition of *abhāva* itself given above is framed with a reference to *bhāva,* 'existence, occupation' etc. The same is the case with Pāṇinian definition of zero, viz. *adarśanam lopaḥ,* which defines *lopa,* not in absolute terms, but with the negation *(cf.* the negative particle *a* in *adarśanam)* of *darśana* which conveys many meanings as we have seen above. Even the concept of the mathematical zero is based on the idea of 'non-occupation' which indicates an implied reference to

'occupation'. Even BERTRAND RUSSELL's logical definition of zero, viz. "The number zero is the number of terms in a class which has no members, i.e. in the class which is called the null-class', or "0 is the class whose only member is the null-class"[53] presumes an *a priori* existence of a class which has some members.

The above discussion brings out clearly two important points (i) the concept of zero or *lopa* or emptiness - whatever we call it - can never be explained in absolute conditions and consequently words, and (ii) it can only occur in a technique of analysis which starts from "richer comprehension" (to use AL GEROGE's phrase) and goes on to explain "subordinate categories;" that is, in other words it occurs only in structural analysis. And mathematics also does not seem to be an exception to this. Was mathematics "structural" in its beginning ? This fact also indicates a situation in which the borrowing of the concept of zero seems to be from philosophy to mathematics and not from mathematics to philosophy; in the present case, from Pāṇini to mathematics and not from mathematics to Pāṇini. The subject is vast and requires a deeper investigation by mathematicians and philosophers.

4. Pāṇinian zero and the śūnyavāda of the Mādhyamikas.[53A]

The discussion of the Pāṇinian linguistic zero which corresponds, as we have seen before, to the mathematical zero, cannot be complete without the mention of and

53. *cf.* BERTRAND RUSSELL, *Introduction to Mathematical Philosophy*, published by Simon and Schuster, New York Ch.III, p.23.

53A. For a comparison of the *śūnyavāda* of Buddhism with the positivist *brahmavāda* of Śaṅkarācārya, *cf.* V. N. JHA, 'Śaṅkara vis-a-vis *śūnyavāda*,' Prasanna Pārijāta, Shri Datta Maharaj Kavīśvara Felicitation Volume, 1990, Pune.

comparison with the high-sounding theory of *śūnyavāda* propounded by the Mādhyamika school of Nāgārjuna in the Buddhistic philosophy. Out of the four main schools of Buddhism, viz. *vijñānavāda, vaibhāṣika, sautrāntika* and the *mādhyamika,* only the last one viz. the *mādhyamika* school discusses and propounds the theory of *śūnyavāda.*

Actully to compare Pāṇinian zero-concept with the *śūnya*-concept of the Buddhism, as expound by Nāgasena and Nāgārjuna and with the *abhāva* - concept of Nyāya-Vaiśeṣika-system of logic as expounded by Kaṇāda, Gaṅgeśa Upādhyāya and Annambhaṭṭa would be an anachronism because the tentative dates as are generally accepted for all these authors are :

Pāṇini, 7-4 century B.C; Nāgasena *(Milindapañho),* 1st centruy B.C;[54] Nāgārjuna, 150-250 AD; Kaṇāda, 100-200 AD; Gaṅgeśa Upādhyāya, 1200 AD and Annambhaṭṭa, 1600 AD (according to V. RAGHAVAN).[55] It can be easily seen that all are posterior to Pāṇini. In spite of this a comparison is very interesting since all of them describe the same phenomenon of emptiness or non-occupation by different technical terms lake *lopa, śūnya* and *abhāva.* The only authors who come nearer to Pāṇini are Nāgasena, Nāgārjuna and Kaṇāda.

As regards the Buddha, he never wrote anything at all; much less in Sanskrit. He imparted his advice and propogated his philosophy only orally and, that too, in Pāli

54. *cf.* M. WINTERNITZ, *History of Indian Literature,* Vol. 2, p. 175

55. *cf.* for all these dates, KARL H. POTTER, *Bibliography of Indian Philosophy,* Motilal Banarasidass, New Delhi, 1970, pp. 2,5, 273.

and not in Sanskrit. The only Pāli text that discusses the concept of *Śunyavāda* in some detail is the *Milindapañho* (= Questions of Milinda, who is an historical figure and is known to classical Greek historians as Menander, the Greeck ruler of Ghazni and adjoining areas of Kabul valley)[56] whose probable date is first century B.C. The book is a kind of dialogue between the King Milinda who puls the questions and Nāgasena who answers them. The Buddhistic philosophy regarding the *sūnyavāda* as expounded by may be sumned up in nutshell as follows :-

"A man's nail's, hairs, teeth, skin, or flesh, each of them or collectively, cannot form his individuality. Not even mere names signify anything for forming a complete idea of the individual concerned as it is supposed..... This point has been illustrated by the simile of a chariot just as different parts, such as, pole, axle, wheel, frame etc. When combined together produce a chariot. By mechanically dividing it, the chariot can never be found.... In such a way, an individual is based on some factors. These factors are called the aggregates (khandhas).... These are subtle mental elements belonging to psychological and mental aspects of human individuality.... According to Nāgasena the whole thing in its organic unity and co-existing together comes to be designated as an individual with such and such name.... But in the highest sense it does not mean 'a living soul within."[57] The philosophy thus comes to the conclusion that

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56. A. K. NARAIN, The Indo-Greeks IBH Vol. I, Introduction pp. 24-25.

57. RABINDRA NATH BASU, *A Critical Study of the Milindapañha*, Firma KLM Private Limited, Calcutta, 1978, pp. 93-94.

there is nothing at the root of this Universe which can be pointed out to be the basic principle or cause.

Nāgārjuna is the next Buddhistic philosopher to expound the philosophy of Śunyavāda in better philosphical terms. The whole argument of Nāgārjuna can be briefly stated as follows : any creation requires the three causes, viz. *kartā*, *karaṇa* and *samavāyikāraṇa*. Thus in the creation of the *ghaṭa*, earthen pot, the three factors viz. the pot-maker, the earth (*mṛttikā*) and the stick and the wheel are required. In other words, even though the pot-maker is said to be the *kartā* of the pot, he by himself is incapable of manufacturing the pot without the help of the relevant material viz. the earth, the stick, the wheel, water etc. His *kartṛtva* is thus *sāpekṣa* i.e. relative to the other auxiliary material. Since what is *sāpekṣa* i.e. relative in theory and practice is not the truth and has no independent existence by itself (as in the case of the illustration of pot) so also in the case of the whole world, its original cause, by whatever name one may call it, *brahman, īśvara, kāla, prakṛti* or *paramāṇu*, is not independent in the sense that it has any power to create the world by itself and requires no help from outside of itself. This is what is called by *pratītya samutpāda* or *bhāvānām nissvabhāvatva* by Nāgārjuna. If this logic is correct, it leads us to the next conclusion viz. that there is no independent cause at the root of the whole creation; in other words, there cannot be any single, independent entity which can be cited as the root-cause of this vast creation. *cf. Mādhyamakaśātra*, 17.31 : *yathā nirmitakam śāstā nirmimītarddhisaṁpadā / nirmito nirmimītānyam sa ca nirmitakaḥ punaḥ* // also 17.32 : *tathā nirmitakākāraḥ kartā karma ca tatkṛtam / tad yathā*

nirmitenānyo nirmito nimitas tathā // Nāgārjuna, therefore, says *(cf.* 1.10) : *anālambana evāyam san dharma upadiśyate / athānālambane dharme kuta ālambanam punaḥ.*

Then Nāgārjuna comes to the conclusion of *śūnyatā 'zero-ness' as pratītya-samutpāda; cf. Madhyama- śastra.*[58]. *yaḥ pratītyasamutpādaḥ śūnyatām tām pracakṣmahe.* The commentator Candrakīrti explains the term *pratītya-samutpāda* as : *yo'yam pratītya-samutpādaḥ hetupratyayānapekṣyaḥ aṅkuravijñānādi- prādurbhāvaḥ, sa svabhāvena anutpādaḥ. yaśca svabhāvena anutpādo bhāvanām sā śūnyatā.* He quotes from different texts; *cf.* a quotation from *Āryalaṅkāvatāra : svabhāvānutpattim saṁdhāya mahāmate sarvadharmāḥ śūnyāḥ iti mayā deśitāḥ; cf.* also one from the text entitled *Dvyardhaśatikā:śūnyāḥ sarvadharmāḥ nissvabhāvayogena.* No single independent entity possesses independently the power to create the world; everything in the world is devoid of such independent power. This is the *nissvabhāvatva* or *naissvābhāvya* of the entity. Such a state of being devoid of *svabhāva* is in fact what is meant by the term *śūnyavāda* in the system of the *Mādhyamika* school.

The whole argument clearly means that Nāgārjuna does not accept *śūnya* in the sense of total 'void or nothingness' as the root-cause of the world, but his *śūnya* refers to the fact that there is no single, independent principle at the root of the creation, which by its inherent nature is omni-potent, omni-scient and omni-present. This is made very clear by the commentator Candrakīrti on the verses 14.11,12,13:

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58. *cf. Madhyama śāstra,* ed. by P. L. VAIDYA, Buddhistic Sanskrit Texts, Serives 10, Mithilāvidyāpīṭha, Darbhanga, 1960

abhāvārtham hi śūnyatārtham āropya prasaṅga udbhāvito bhavatā. na ca vayam abhāvārtham śūnyatārtham vyācakṣmahe, kim tarhi pratītyasamutpādārtham. This clearly refutes the idea of the *śūnya* as 'the total void, nothingness or absence'- What the *śūnyavāda* refers to seems to be *svabhāva-śūnyatā,* 'incapacity by its inherent nature' of a single, independent principle as the root-cause of the creation.

The *śūnyavāda* of the *Mādhyamika* school of Buddhism, however, is variously interpreted and understood or misunderstood.[59] And, on the authority of Nāgārjuna and his commentators themselves, they interpret *śūnya* to mean 'a positive entity'.

The *śūnya* of the *śūnyavādin mādhyamika* school of Buddhism thus swings between total void and the positive entity.

If, therefore, the *śūnyavāda* does not mean and deal with *śūnya* in the sense of void, nothingness or absence *(abhāva),* but means or refers to positive entity, it is of no use to us from linguistic grammatical or mathematical point of view so far as its comparison with the Pāṇinian and mathematical zero is concerned. Even if we take Nāgārjuna's *śūnya* to mean void, in the philosophical sense or zero in the mathematial or Pāṇinian sense, it does not serve any purpose for us as linguists and grammarians because the *śūnyavāda* does not state anywhere any formal

59. *cf.* S. RADHAKRISHANAN, *History of Indian Philosophy,* Vol. I. pp. 662 ff, 1929; *cf.* also by the same author, *Histroy of Philosophy - Eastern and Western,* George Allen and Unwin Ltd. *London,* 1952, pp. 152-218.

procedure, as in Pāṇinian technique, to arrive at the zero, or does not enunciate any positional analysis or notation, as in mathematics, which can account for the presence of an unoccupied or vacant place.

5. Pāṇini and the Naiyāyikas

There is yet another system of Indian philosophy which treats the concept of zero; the term for zero that it uses is *abhāva;* the system in question is the *Nyāyaśāstra.* The *Nyāyamañjarī (Prathamāhnika)* defines the *abhāva* as follows : *na hi niḥśeṣasāmarthyarahitatvam abhāvalakṣaṇam, api tu nāstīti jñānagamyatvam. satpratyayagamyo hi bhāva iṣyate, asatpratyaya-gamyas tu abhāva iti.* The *Siddhānta Candrodaya,* a commentary on *Tarkasaṁgraha* by Srikṛṣṇa Dhūrjati says : *pratiyogijñānādhīnatvam abhāvatvam.* The *Siddhānta Muktāvali* of Viśvanātha Pañcānana explains *abhāva* as : *dravyādiṣaṭkānyonyābhāvatvam.* The *Sarvadarśana-saṁgraha,* in its exposition of *Nyāya*-theory states the following definition of *abhāva : asamavāyatve saty asamavāyitvam.* All these definitions, however, are not absolute definitions of *abhāva* and are framed in relation to *bhāva* or existence. All these definitions of *abhāva* in *Nyāya* also donot serve our purpose of comparison, first, because they are all relative to *bhāva,* secondly like the *Mādhyamika śūnyavāda*, donot lay down any formal procedure to arrive at *abhāva.* Thirdly, in both, the *Mādhyamika* and *Nyāya* schools, the *śūnyavāda* and the *abhāvavāda,* are principles and not technique unlike in Pāṇini. The *śūnyavāda* refers to *śūnya* as the highest principle at the root of the universe; the *abhāvavāda* takes *abhāva* as one of the seven basic entities and not a

technique; *cf. Tarkasaṁgraha; dravyaguṇakarmasāmanya-viśeṣasamavāyābhāvāḥ sapta padārthāḥ.* The *abhāva* in the *Tarkasaṁgraha,* therefore, can at the most compare only with one of the Pāṇinian six *vyavasitas* and not *lopa* or zero.

Of the four scientific systems, viz. Pāṇini's *Aṣṭādhyāyī,* mathematics, the *śūnyavāda* of the *Mādhyamika* school of Buddhism and the *abhāvavāda* of the *Naiyāyikas,* the mathematical system of numbers is the only science which can be compared with the Pāṇinian system of grammar of words in so far as the aspects of formal procedure and positional analysis and notation are concerned. The other two systems are also considered here because they are the systems which have influenced and channelled the Indian scientific and philosophical thought to a very large extent in ancient times. This fact is examined to see if Pāṇini and also mathematics in ancient India is influenced by them. So far as the concept of *lopa* or zero is concerned, we find that the two philosophical systems have not contributed anything to Pāṇinian or mathematical thinking and analysis.

The use of the concept of zero indicates the utilisation by Pāṇini of the mathematical principle of 'division and subtraction,'especially the cases where an inserted zero has its non-zero counter-part in other forms lend support to such a supposition. Moreover, the concept of zero itself pre-supposes morphological analysis in terms of position or order of morphemes, bound or free. Pāṇini has actually stated explicitly the position of suffix as *para* i.e. posterior to the *prātipadika; cf.* the *sūtra, paraś ca,* 3.1.2. All these points add greater strength to the hypothesis that Pāṇini has utilised certain mathematical techniques and principles in his linguistic description of Sanskrit. The idea of position is only

comparable to that in mathematics.

All this, it must be confessed, presupposes a certain advance in mathematics prior to Pāṇini's times which, in the absence of any pre-Pāṇinian evidence in the field, cannot be proved.

It is at this stage of our study of Pāṇini's grammar very premature to hasten to the conclusion that Pāṇini knew mathematics. The affirmative or negative answers to the questions like whether Pāṇini knew mathematics, or whether he borrowed certain mathematical principles or algebraic techniques to describe the Sanskrit language depend upon stronger internal and external evidences. It is also possible that the ancient Indian mathematicians might also have borrowed certain techniques from Pāṇini.

The question who borrowed from whom, will get its answer only in the context of wider and stronger evidence. The problem could to a certain extent be solved if at least one third, or even one-fourth, of the 4000 *sūtras* of Pāṇini could be suitably represented mathematically. In doing so it must be borne in mind that linguistic techniques or description can never be represented fully mathematically; that is to say, such mathematical representation of grammatical rules will never satisfy all the rigorous criteria of the mathematical rules. One has, therefore, to make certain allowance for the looseness in such representations. What is important to see in such cases is only the basic resemblance of the technical principles employed in mathematics and in Pāṇini's grammar. If the two basically agree, we have sufficient grounds to believe that either Pāṇini has borrowed the principles from mathematics or mathematics owes some debt to Pāṇini.

It is also possible that both might have borrowed from an altogether different yet common source. Can it be logic or mathematical calculus ? All this, it must be confessed, would again pre-suppose a certain advance in the field of logic, mathematics and mathematical calculus; unfortunately there is no pre-Pāṇinian evidence in the field. But that certain Pāṇinian and mathematical principles resemble one another cannot be forgotton.

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V

THE IT-ZERO—SOURCE OF

1. As we have suggested earlier, each type of zero-technique used by Pāṇini in the three different spheres may have a different back-ground, history and source. So is the case with the *it*-zero also.

The *it*-sounds, as we have discussed earlier, are not linguistic units; they are extra-linguistic entities in so far as their purpose, function and nature is concerned. In nature, they are just means of the technique and their function is that of a sign, marker or symbol - whatever one may call them - which symbolises or stands for or represents some specific grammatical functions ascribed to them by Pāṇini in well-defined rules.

This technique of words or sounds symbolising, not a particular linguistic category but some process or entity, has its roots in the pre-Pāṇinian Vedic Literature. If we read the voluminous literature of the Vedas, the Brāhmaṇas, the Upaniṣads etc. we find they have profusely made use of the technique of symbolism of sounds to explain mythologies, parallelism, co-relations and/or correspondences of two entities on the same or on different planes.

We find the deities like *agni, indra* etc. symbolising some qualities or process or actions. The following are the references for the deities *agni* and *indra*:-

for *agni : angiḥ prajananam* (symbolising function or action or process) G.B.1.2.15; *agniḥ prajāpatiḥ,* (symbolising a deity), KS,22.7;10; *agnir eva savitā* (deity), JU 4.12.1.1; *agnir eva brahma* (entity), G.B.1.5.15, KS.8.4;

agnir vā aśvamedhyasya yoniḥ, TB.3.9.21.2; *agnir vāva pavitram,* TB.3.37.10; *agnir vāva yamaḥ;* TS 3.3.8.3;GB.2.4.8; *agnir amṛtam* (symbolising something abstract), MSB.10.2.6.17 etc.

for indra : *indro dyauḥ* (symbolising something abstract), *vy uta bhūmiḥ* (concrete entity), *indraḥ samudraḥ,* MS.4.14.7; *indro mādhyandinam savanam* (symbolising the process of pressing Soma),TA 5.1.6; *indro yajamānaḥ,* KS 7.10 etc.

The references of this type can be multiplied thousandfold. What these equations based on symbolism mean is that, apart from their physical correspondences, the symbols *agni, indra* etc. stand for the functions or qualities of the things they symbolise; or, *vice versa,* the things which are symbolised by words like *indra, agni* etc. stand for the functions or qualities of the latter.

2. Not only this, but this technique of symbolism by words or phrases has been brought down to the level of sounds which are made to symbolise something, abstract or concrete. And this process began in the Vedic times itself. Examine, for example, the following single sounds functioning as symbols, used in the Vedic literature :

a iti brahma, AĀ, 2.3.8; *akāro vai sarvā vāk,* AĀ 2.3.6; *ā pra iti ca vā sarvam,* JB 1.180

om iti vai sāma, om iti manaḥ, om iti indraḥ, JU 1.2.2.2;

om iti vai svargo lokaḥ, AB.5.32; *te oṁkāram brahmaṇasputram jyeṣṭham dadṛśuḥ;* GB. 1.1.2.3; *rasa oṁkāraḥ,* JB. 2.78.

kam vai prajāpatiḥ, Kāṭhakasaṁkalana, 48.1; 138.5;

prajāpatir vai kaḥ, TS 1.6.8.5 etc. It is on the basis of this symbolism of *ka = prajāpati* that the famous Rgvedic passage, *kasmai devāya haviṣā vidhema,* RV.10.121.1-9 is explained as *prajāpataye devāya haviṣā vidhema,* by substituting the word *prajāpatī* for *ka* in the stanza.

chidram kham ity uktam, GB 2.2.5

ṇakāro balam ṣakārah prāṇa ātmā, AĀ.3.2.6;

om iti satyam, na ity anṛtam; AĀ.2.3.6; *yad vai na iti ṛcy om iti tat,* MŚB.1.4.1.30.

annam vai himkāraḥ, hum iti vā annādyam pradīyate, JB.3.93; *eṣa vai sāmnām raso yad himkāraḥ* TMB 6.8.7; *eṣa vai stomasya yogo yad himkāraḥ,* TMB 6.8.6; *tad etasya yajñasyāgre yad himkāraḥ,* GB.2.3.9; *śuklam eva himkāraḥ* (symbolising the quality *śukla,* 'white'), JB.1.11.2.1; Many references are available on *himkāra* i.e. the sound *him.*

In the following are given some meaningless sounds and utterances :

hum bag hum bag iti śrīkāmasya, bag iti śriyam praṇāyanti, JUB 3.3.3.3; so also sounds like *vauṣaṭ, vaṣat, phaṭ, hum* etc.

Innumerable references of sounds standing as symbols for some god or thing or entity (abstract or concrete), function, action or process, qualities etc. or for anything under the sun for that matter, can be quoted from pre-Pāṇinian literature. The *ekākṣarakośa* (=dictionary of single sounds) in Sanskrit is an example of its kind of single sounds having meaning. Even BD quotes two single sound *nipātas* viz. *i* and *u* as having meaning; *cf.* BD on the *sūtra,* 1.1.14 *(nipāta ekāj anāṅ) : i vismaye ... u vitarke.* These

symbols vary from single sounds to a group of sounds, meaningless or meaningful, to words and phrases and even to the names of gods. The *tantra*-literature in India and Tibet is a good example in this respect which uses symbols like *am, kam, jam, vam, lam* etc. as also mystic utternaces like *hrām, hrīm, hrūm, hrom* etc. which are apparently meaningless but which, according to the tradition of the *tantras,* have a great significicance and convey a definite meaning. In all the above examples of sound-symbols, the symbols are used as substitutes for the names or qualities or functions of the deity concerned. As soon as the deity appears or manifests or functions, the symbols are discarded. They are used as symbolic abbreviations for the names of the deity.

3. With this background, it will be easy to see that what Pāṇini has done in employing the sounds as symbols for some grammatical function is exactly the same as that of the *tāntrikas* or Vedic seers above. He also takes the single sounds as symbols, terms them as *it,* invests them with definite powers in pre-defined spheres and lets them loose to work; and they work accordingly. But he goes a step further than the Vedic seers. He does not invest the sounds with powers of merely symbolising linguistic entities, but invests with powers of symbolising grammatical functions and processes.

Again, there need not necessarily be a physical identity between a symbol and the thing symbolised; when JB says (2.51) that mind and moon are *hemanta* season *(mano hemantaḥ candramāḥ hemantaḥ),* there is no question of the two things being cent per cent identical with *hemanta* on any plane, physical or metaphysical; they are taken as

similar or equal, not identical, merely on the *lākṣanika* plane. In the same way, Pāṇinian sounds functioning as symbols for grammatical operations and modifications are equal to their functions only on a *lākṣanika* i.e. secondary level. Actually, Pāṇinian symbolism works only on the purely artificial level, meant to bridge the gap between the pure formal level on one hand and the non-formal level on the other. The sounds work only on an artificial formal plane, which is created out of pure imagination.

There is yet another point of similarity between the two symbolisms, viz. Vedic and Pāṇinian. Just as the Vedic philosophers or ritualists are working on more than one planes, viz. the physical and the metaphysical (or, even three, viz. *ādhibhautika, ādhidaivika* and *ādhyāmika*) and hence they have to create a *lākṣanika* plane to express the co-relations between these planes, Pāṇini is also working simultaneously on two planes, one, the formal and the other, the non-formal, and uses the symbols. With two planes, we have the following four combinations of symbols with planes :-

3.1 formal symbol for formal categories, such as *ṭi, ghi, ghu etc.*

3.2 formal symbol for non-formal category, such as the different suffixes expressing the non-formal categories of meaning, gender, number, accent etc.

3.3 non-formal symbol for non-formal category. This type cannot exist in Pāṇini's grammar which is a purely generative, formal grammar, and lastly,

3.4 non-formal symbol for formal category, which covers up our present *it*-zero technique. Though Pāṇini used

the grammatical category of phonemes as symbols, in the capacity of being *it*-sounds they all cease to be a formal, linguistic category and start functioning as non-formal symbols, standing for the grammatical operations like *guṇa, vṛddhi* etc. or their absence. All these grammatical operations are merely symbolised by the sounds and are not substitutes for them. Unlike the linguistic zero, therefore, the *it*-zero is not an *ādeśa*.

It will be clear from the discussion above that the source for the Pāṇinian technique of *it*-zero is the pre-Pāṇinian Vedic technique of the employment of symbols of sounds and words. The source for the Pāṇinian it-zero is, therefore, different from that of the linguistic zero. The only difference between the Vedic or Tāntrika symbolism and Pāṇinian symbolism is that while the former might have been used out of the considerations of sacredness, secracy and perhaps brevity, the latter is motivated only out of the necessity for brevity in linguistic description.

In the sense that the position and nature of the *it*-sounds and hence *it*-zero is outside the science of grammar and linguistics, though they are empowered to exert their influence in the sphere of grammatical operation and modifications, the *it*-zero, as a symbol, is perfectly comparable to the signs of plus, minus, multiplication, division, derivation, integration etc. which are used in modern mathematics. The signs are from outside the sphere of mathematics, yet they indicate the mathematical operations in the field of mathematics. Just as the signs of mathematical operations recede in the background or are totally omitted once the operation is over, similarly the *it*-sounds are totally elided by Pāṇini. We donot know what

symbols the ancient Indian mathematicians, of pre-Pāṇinian or contemporaneous to Pāṇinian times, were using since no written record of those times is available. But that they must have been using some signs in the place of the words like *dhana,* ˌ(plus), *ṛṇa* (minus), *guṇākāra* (multiplication), *bhāgākāra* (division) etc. is very obvious. And it is because either writing might not have been known or because the practice of writing down anything might not have been in vogue, (perhaps for fear of the exposition of the secret knowledge) that Pāṇini might have chosen the sounds as symbols of operation which could easily be handed down by oral tradition.

The *it*-symbols can also be compared to what is called an *upalakṣaṇa* (lit. subordinate or secondary adjective) in *Nyāya.* It is contrasted with the *mukhya lakṣaṇa* called *viśeṣaṇa.* The *viśeṣaṇa,* which is a permanent mark of something, is always associated with the thing, as in the example, *daṇḍī saṁnyāsī,* 'a *saṁnyāsī* with a *daṇḍa;*' the *daṇḍa* is a permanent marker of *saṁnyāsa;* whoever is a *saṁnyāsī* must keep with himself the *daṇḍa.* The *upalakṣaṇa* is a temporary, not permanent, mark of a thing, as in the example, *kākavad devadattasya gṛham,* 'the house on which the crow is presently sitting belongs to Devadatta'. Here, the crow may fly away, yet the house remains as it is and still belongs to Devadatta.

In the same way, the *it*-sounds are the *upalakṣaṇa* of the grammatical modifications. The grammatical modifications brought about by the *it*-sounds stay on, though the *it*-sounds themselves are made to 'fly away' like the crow.

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VI

THE ANUVṚTTI-ZERO — SOURCE OF

When we come to search for the source of the third type of zero-technique used by Pāṇini in the *sūtra*-arrangement in order to achieve brevity, we have to search for a different field. The data, of course, are the same, viz. the pre-Pāṇinian Vedic literature, but with a difference.

As we know, the Vedas are analysed into their different words, morphemes and suffixes by the *padapāṭha*, obviously with a view that there should not be any ambiguity as regards the Vedic meaning based on different analyses by different people. The *padapāṭha* of the ṚV is done by Śākalya traditionally. The *padapāṭha* is, therefore, rightly called as 'a commentary'[59A] on the Vedas, perhaps the first commentary attempting the explanation of the Vedic verses. While writing the *padapāṭha*, the *padapāṭhakāras* confronted a peculiar situation in which repetitions[60] of whole verses, verse-feet and even of words were involved. And the problem before them was : whether all these repetitions of the verses, partially or fully, were to be subjected to re-writing or re-reciting? That would have been a gigantically onourous job. They, therefore, ingeneously deviced a technique to avoid and drop the

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59A. *cf. samayānukramaṇī,* Appendix IV,p. CIX in *Ṛgvedānukramaṇī,* ed. C. K. RAJA, Madras, 1932 : *saptamy anukramaṇikā śākalyam anudhāvati/ vyākhyātaivaṁ hi teneyam saṁhitā padadarśanāt//*

60. For vedic repetitions, *cf.* M. BOOMFIELD, *Rig-Veda Repetitions,* HOS.20, 1916; also *A Vedic Concordance,* HOS 10; 1906; reprinted in 1964.

repetitions of the former passages in successive passages. This technique is known as the techuique of *galita* or *galanta* (lit. dropped down) and the dropped-out passages were named as *galitas* or *galantas*. The term *galita/galanta* is quite well-knwon in the circles of Veda-reciters. It is defined as : *padapāṭhe kadācit pūrvaprāptānām padānām punaḥprāptyavasare pāṭhapradarśanaparityāgaḥ/sa parityagaḥ samayaśabdena vyavahriyate/parityaktāni padāny api tena śabdenocyante//*[61] What this means in short is that the repeated *padas* are dropped out and this dropping out is called by the name *samaya*.[62] The rules of accepting this or that as *galita* vary from Veda to Veda.[63] But that all the Vedas adopted this or that system of *galita* in the *padapāṭha* is an irrefutable fact. The words which were thus dropped were not repeated again by the reciters of the Vedic *padapāṭha* as well as Vedic reciters and were marked in the old manuscipts by the zero sign[64] or by the word marked *galita* itself. Thus, ṚV.2.1.16 is wholly

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61. *cf. Ṛgvedaprātiśākhya,* ed. PASHUPATI NATH SASTRI, Calcutta, 1927, p.143.

62. *cf.* LAKSMĪDHARA SŪRI *Galitapradīpa,* ed. by *Shri. Shrikṛṣṇadeva, Sarasvati Suṣamā, saṁvat* 2016, verse 2, p.2 : *alakṣyatvād anūhyatvād adṛṣṭānuvidhānataḥ/apy eṣām prātiśākhyādyair ataḥ samayanāmatā //* He defines *galita* as : *brahmayajñapārāyaṇādiṣu prāthamyena procyamānasya ṛcātmakavedasya dvitīyaprakṛtibhūte padapāṭhe prāyaśaḥ punaruktapadasamūhānām lopo bhavati/tasyaivātra galitasaṁjñā//*

63. *cf. Galitapradīpa, ibid. prastāvanā, kha : paraṁ ceyam galitapadavyavasthā sarveṣu vedeṣu bhinnā.*

64. for a more detailed study of *galitas, cf.* K. P. JOG, 'On the *galitas in the Padapāṭha As a Means of Ṛgvedic Interpretation',* IA Vol.III, Nos. 1-4, 1969, pp.56-82; *cf.* also K. V. ABHYANKAR, *Vedapāṭhacarcā* with *upalekhāsūtram,* BORI, Pune, 1974.

repeated at 2.2.13; the latter *rc* is, therefore, the *galita* and is represented by zeroes or the word *galita*; *cf.* also the *ṛc* 2.11.21 repeated at 2.15.10, 2.16.9,2.17.9, 2.18.9, 2.19.9, and 2.20.9 at which places it is marked by zero.

That the *galita*s were dropped out from the succeeding *padapāṭha* does not mean that they were not part of the saṁhitā-text at that place. They enjoyed in the saṁhitā the same status as others which were not *galitas* and were recited in their proper places in which they originally occurred.

Now, given this fact and phenomenon in pre-Pāṇinian times regarding the technique of dropping out from the succedding part the identical or repeated portion as a means obviously of brevity and saving time, we immediately come to know the origin and source of the Pāṇinian technique of dropping out the identical words from the successive *sūtras*. Pāṇini, as a skilled technician, takes the hint and employs the technique in the arrangement of the *sūtra*. And we have this wonderful technique which we call by the name *anuvṛtti*.

As a general rule, the condition for dropping the repeated words in the *padapāṭha* is that the number of words repeated must be always more than three or the whole *pāda* or verse.[65] But Pāṇini narrows down this condition to even a single word. So also in mathematics when there is the mathematical operation of factorisation. The reasons are that both Pāṇini's grammar and mathematics are formal sciences and have nothing to do with non-formal categories, while the *padapāṭha* considers the meaning also.

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65. *cf. Galitapradīpa, ibid. p. kha, sarvatra padatrayān nyūnaṁ galitam nāsti; punaruktaḥ saṁpūrṇo mantro galito bhavati.*

VII
RESUMÉ

1. We are now in a position to take a panoramic view of all the zeros used by Pāṇini in his grammar for the purposes of linguistic description of the Sanskrit language.

There are, as we have seen before, three types of circumstances in which the technique of zero can be said to have been employed by Pāṇini. The first type relates to purely linguistic description and the zero in this sphere can be rightly termed as 'linguistic zero' in the sense that it is employed for the sake of symmetry in description. This urge for symmetry presupposes a certain principle like structural approach underlying it. This type of zero can be suitably compared with the zero in mathematics, which is used to indicate a vacant place, as in 125 and 105 in which the zero in the latter indicates the place of decimal and can compare with the number 2 in the former. Thus though numerically zero is not equal to or identical with the number 2, from the point of view of its capacity as an indicator of the place, it is fully on par with the latter. In the same way, though phonetically the zero of *śap* in the case of the roots in the second conjugations denotes total absence of any phoneme, its value as an indicator of the place in between the root and the termination is fully on par with any other non-zero suffix or vikaraṇa which occupies a place in between the root and the termination. And we can safely equate *śap* = O in every sense. The equation would be true in both the senses, viz. *śap* amounts to zero, as well as *śap* is on par with zero so far as its place-value is concerned.

Unfortunately, we donnot get any pre-Pāṇinian work, either on mathematics or any other subject which uses this

type of positional analysis and to which the Pāṇinian technique can be traced back. We have therefore to remain satisfied with only its comparison with the post-Pāṇinian mathematical technique based on position.

2. When we come to examine the technique of *it-saṁjñā,* in which the zero of the extra-linguistic *it*-sounds is employed by Pāṇini for frutiful purposes, we enter into a purely technical field, dealing with the technique of description, not only linguistic but of any kind. The technique of *it-saṁjñā* or some such similar technique can be employed in any field by an intelligent scientist. The purpose involved in this technique is of symbolism. The presence and absence of the *it*-sounds symbolises different grammatical functions in Pāṇini's grammar.

As we have said before, the technique of symbolising something by a briefer symbol is not unknown to the pre-Pāṇinian literature of the Vedas, Brāhmaṇas and Upaniṣads. This literature, therefore, seems to be source for the Pāṇinian technique of *it-samjna.*

We can analysise the technique of symbolism into four stages :-

2.1 The pre-Pāṇinian stage of the Veda, Brāhmaṇa and Upaniṣads. In this tage, as seen earlier, the different deities, sounds, mantras stand for either some action (as in *agniḥ prajananam)* or concept *(om iti brahma)*

2.2 The Māheśvara *Sūtras* come second in line in pre-Pāṇinian times to utilise the technique of symbolising something with any - preferably shorter - phrase. The author of these *sūtras* employed the symbolism of the sounds to indicate the final limit of the *pratyāhāra* and consequently to frame a *pratyāhāra* from the given sounds. This technique

seems to have been borrowed by later mathematics in which the range or extent of a straight line is indicated by the initial and final points. The function of this technique is, however, limited only to this extent and the *it*-sounds of the *Śiva-sūtras* are not infused with any other power.

2.3 When we come to the Pāṇinian technique of *it-samjnā,* which is the third stage in the development of the technique of symbolism, we find that apart from taking hints from the Vedic literature and the *Śivasūtras*, Pāṇini extended it to a still more complicated status of empowering the *it*-sounds with functions of different and varied grammatical operations of *vṛddhi, guṇa,* their absence, accent etc. And, as we have examined it, he has succeeded in it to an infinite extent.

Not only this. There is yet another side to look at this technique. A science and the technique used in it to explain the phenomena within its field are completely two different things. The numbers in mathematics, for example, are totally different from the operational symbols like plus, minus, division, multiplication etc. The technique is always extra-scientific, meant to explain the phenomena in the science. But when we read Pāṇini's grammar, this difference between the borders of the technique of symbolic sounds and the grammatical functions that they perform totally disappears in the grammar, so much so that not only that the technique of *it-samjna* does not look alien to the grammar, but that it creates an impression that it is the most natural to it and that it is the only technique by which the grammatical phenomena can be explained.

The third feature of the Pāṇinian technique is that it restricts its symbolism only to the formal plane of

grammatical operations.

2.4 When we come to Kātyāyana (for which see Appendix 3) we find that his technique of *it*-sounds not only transcends the limits of formality but it works exclusively on semantic plane like synonyms, meaning, general *(sāmānya)* and particular *(viśeṣa)* etc. It thus presents a complete contrast to the Pāṇinian technique. One must, of course, admit that the technique of symbolism by sounds can be easily extended to the semantic plane and that Kātyāyana, borrowing perhaps from pre-Pāṇinian Vedic and Pāṇinian texts, has certainly displayed a further stage of development.

This thus seems to be the journey of the technique of symbolism in general and sound-symbolism in particular - from concrete to abstract, from formal to non-formal, from simple to complex. The Sanskrit grammarians in particular, however, seem to have utilised the technique of the *it*-symbols and their consequent zero very intelligently and successfully.

3. The third type of zero, viz. *anuvṛtti*-zero, seems to have been borrowed by Pāṇini from the *padapāṭhakāras* who use the technique of *galitas* or *galantas* in cases where the *pādas*, verses, distishes of the Vedic *mantras* are repeated *in toto,* and the repeated part/s are indicated by zeroes in the *padapāṭha.* This same principle of dropping the common elements from the prior portion in the next, consequent portion is used, as we have shown, in the mathematical procedure of factorisation. In this case, mathematics definitely seems to be the borrower from the *padapāṭhakāras* and Pāṇini.

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APPENDIX 1

The *paribhāṣās* on the *it*-zero

Let us now examine the position or status of the *it*-sounds from the point of view of the ancient grammarians and commentators on Pāṇini's *Aṣṭādhyāyi.*

After the primary discussion of the Pāṇinian *sūtras*, 1.3.2 - 1.3.9, Patañjali comes to the core of the problem raised above, viz. what type of strange technique it is - to create a category and then to negate it as soon as it is created. The *pūrvapakṣa* states very emphatically that the zeroing of the *it*-sounds is not logically consistent, because once a category is created or accepted, it cannot be immediately rejected or negated; such a technique has no logical basis at all. In clearer terms, what the *pūrvapakṣa* says is : we come to know the existence of the *it*-sounds because they are pronounced in the *sūtras;* in the same breath we know also that they are elided from the forms. Thus accepting the existence and simultaneous non-existence of a category is an incompatible logical position.

To this Patañjali replies that this is a logically perfectly compatible position because the category of *it*-sounds is created to account for or perform certain grammatical operations. And they are elided because they are not seen or required in the language. The *it*-sounds exist in so far as the performance of a grammatical operation is concerned; they do not exist so far as the linguistic, fully finished formations are concerned. *cf.* Patañjali on the *sūtra*, 1.3.9 : *anubandhalope bhāvābhāvayor vipratiṣedhād aprasiddhiḥ/anubandhalope bhāvābhāvayor virodhād aprasiddhiḥ/na jñāyate kenābhiprāyeṇa prasajati kena*

nivṛttiṁ karotīti/siddhaṁ tv apavādanyāyena / siddham etat/ katham / apavādanyāyena / kim punar iha tathā yathotsargāpavadau / bhāvo hi kāryārthaḥ / ananyārtho lopaḥ / kāryaṁ kariṣyāmi, iti anubandha āsajyate / kāryād anyan mā bhūd iti lopaḥ //

But this answer by Patanjali raises further questions, the first of which is : whether this *anubandha* i.e. the *it*-sound is or is not the physical part and parcel of the suffix to which it is attached. Patañjali replies that the *it*-sounds are part of the category to which they are applied. He compares the *it*-sounds with the branch of the tree, which is part and parcel of the tree before it is cut down; *cf.* Patañjali - *ekāntas tatropalabdheḥ / ekānta ity āha / kutaḥ/ tatropalabdheḥ / tatrastho hy asāv upalabhyate / tadyathā / vṛkṣasthā śākhā vṛkṣaikānta upalabhyate/*

And after discussing in detail the pros and cons of this position, Patanjali states the final conclusion regarding this problem as that the *it*-sounds must be taken as part of the category - viz. *prātipadika, pratyaya, dhātu, āgama, ādeśa* etc. - to which they are attached; *cf.* Patañjali : *ubhayam idam anubandheṣūktam ekāntā anekāntā iti / kim atra nyāyyam / ekānta ity eva nyāyyam / kuta etat ? atra hi hetur vyapadiṣṭo yac ca nāma sahetukam tan nyāyyam /*

Nagoji Bhaṭṭa, the author of *Paribhāṣenduśekhara* takes up this problem in greater details and elaborates it, with examples, in as many as five *paribhāṣās,* which are as follows :-

(1) *anekāntā anubandhāḥ (2) ekāntāḥ (3) nānubandhakṛtam anekāltvam (4) nānubandhakṛtam anejantatvam* and lastly (5) *nānubandhakṛtam asārūpyam.* All these *paribhāṣas* and the point of view and discussion

of Nāgoji Bhaṭṭa are given in the present Appenedix 1.

Nāgeśa Bhaṭṭa in his *Paribhāṣenduśekhara* opens the topic about the *it*-sounds with the remark - *itsaṁjñakā anubandhās teṣv avayavānavayavatvasaṁdeha āha* (=the sounds called *it* are known as *anubandhās*. Whether they are or are not part of the category to which they are attached?) and states the *pūrvapakṣa* as *anekāntā anubandhā iti in paribhāṣā* No.1, i.e. the *anubandhās* are not part of the category to which they are attached; *cf. anekānta anavayavā ityarthaḥ.* The reason for this position is that if something is part of another thing, it should or must be visible in the body of the thing. And the *anubandhās* are not seen in the body of the usable form; *cf.* Nāgeśa : *yo hy avayavaḥ sa kadācit tatropalabhyata eva, ayaṁ tu na tathā; tadartha- bhūte vidheye kadāpy adarśanāt.*

In *paribhāṣa* No.2, viz. *ekāntāḥ,* Nāgeśa puts forth the *uttarapakṣa* or the *siddhānta* of the problem as : the *anubandhas* are part of the category to which they are attached; *cf.* his remark, *vastutas tu 'ekāntāḥ' ity eva nyāyyam.* The reasons for accepting this position are : The *anubandhas* are available or stated in definite positions and are applied to definite categories. If their positions and categories were not well-defined, they would not have been part of the categories. For example, the *ś* in the *vikaraṇa śap* is an *anubandha* while it is not so in the case of the root *śap* (1st conj. *parasmaipada*). Also, the *anubandha p* in *śap* goes with the *śa* i.e. *a* of *śap* but not with the *śa* i.e. *a* of *śa* (which is the *vikaraṇa* of the 6th conj.). Thus, though any sound is attached as *it* to any other sound from the language, there is a method in this madness, *cf.* Nāgeśa: *śāstre tatratatropalambhād anyatrānupalambhāc ca;*

anavayavo hi kākādir ekajātīyasambandhena gṛhavṛkṣādiṣūpalabhyate naivam ayam. Thus, the choice of attaching this or that sound to this or that category is open only in the beginning of the technique. But, once it is attached both the *anubandha* and the category have their positions, functions and scope delimited and fixed; they cannot be changed. This consequently shows that the *anubandhas* are integral part of the category or the *avayavins.* Secondly, if they are not taken as part of the *avayavins,* the *avayavins* will be read only as being without *anubandhas;* thus, the category *śap,* which is the *avayavin,* will not be taken as *śit* or *pit;* in that case, consequently the grammatical operations, for which the *anubandhas* are introduced in the technique, will not take place. This will wholly mar the very purpose of the technique. It is for this purpose that the *anubandhas* must be accepted as part of the *avayavins; cf.* Nāgeśa : *kim cānavayavatve ṇaśakapratyayādau ṇāder ittvānāpattiḥ, pratyayāditvābhāvāt; dadhnacaś cakārasya vaiyarthyāpattiśca.*

But this position of accepting the *anubandhas* as part or *avayavas* of the categories or *avayavins* raises further problems, which are solved in the next three *paribhāṣās* by Nāgeśa.

The first problem relates to the *anekāltva* (=containing more than one sound) of the *ādeśa.* The Pāṇinian substitute, *auś* for the nom. acc. plu. *jas* and *śas (cf.* the *sūtra, aṣṭābhya auś* 7.1.21) contains the sounds *au* and *ś* and hence becomes *anekāl.* As *anekāl,* it replaces the suffix *jas* and *śas* wholly and not partially,[61] according to the Pāṇinian

61. *cf. Kāśikā* on 1.1.55 : *anekāl ya ādeśaḥ śic ca sa sarvasya ṣaṣṭīnirdiṣṭasya sthāne bhavati.*

sūtra, anekāl śit sarvasya, 1.1.55. It is taken as *anekāl* on the basis of the argument that the *anubandhas* (here, *ś*) are part of the *avayavins* (here, *au);* otherwise, devoid of the *it*-sound *ś,* the *ādeśa* or substitute is only *au* i.e. *ekāl (eka+al).* Now, the problem from technical point of view is : if the *adeśa auś* taken with *ś* as its integral part is already automatically *anekāl (=aneka+al),* the word *śit* in the Pāṇinian *sūtra*, 1.1.55 quoted above, becomes redundant and only shows poor and loose wording of the *sūtras* on Pāṇini's part. The use of the word *śit* in the wording of the *sūtra* on the contrary shows that according to Pāṇini the *it*-sound *ś* cannot be counted as part of the *avayavin auś;* Pāṇini, therefore, had to make a rule that the categories with *ś* as *it* should be taken as *anekāl* and hence should be substituted for the whole.

Nāgeśa refutes this argument in *paribhāṣā* No.3, viz. *nānubandhakṛtam anekāltvam,* which means that the *avayavin's* being single-sound *(ekāl)* or multi-sound does not depend upon the counting of the *anubandha* as its part; it should be *anekāl* only after subtracting the *anubandha* from it. This interpretation is correct in view of the use of the word *śit* by Pāṇini in the above *sūtra*. What the *sūtra* really means is that if an *adeśa* is either *anekāl* or *śit,* it substitutes the whole; and not that because of being *śit,* the *ādeśa* becomes *anekāl.*

That this is the only correct interpretation is also proved by citing the example of the word *arvan* and the *sūtra, arvaṇastrasāvanañaḥ,* 6.4.127, which lays down an *ādeśa tṛ* for the noun *arvan* in all the cases except the nom. sing. *(asau = a-sau);* the final *ṛ* in *tṛ* is an *anubandha.* And the procedure is :

arvan + au (nom. du)

= *arvan + tṛ + au* (according to 6.4.127)

= *arvan+t+au* (*ṛ*=0, according to 1.3.2)

= *arvat+au* (*t* substitutes *n* according to 1.1.52)

= *arvant+au* (*n* added as pre-final according to 7.1.70)

= *arvantau,* nom. du.

If in the case of *tṛ,* the *anubandha ṛ* were part of the *avayavin tṛ,* it would have been taken as *anekāl* and would have replaced the whole *avayavin arvan* and not only the final *n.*

cf. Nāgeśa : *śidgrahaṇam evaitajjñāpakam, tenārvaṇastṛ. ityāder na sarvādeśatvam.*

There is yet another objection to the proposition that the *anubandhās* are part of the *avayavin.* The problem is raised because of the form *dāta,* a past pass. part. from the root √*dai,* which Pāṇini in his *dhātupāṭha* designates as *daip* with *p* as the *anubandha.* The Pāṇinian procedure to arrive at the form *dāta* from *daip* is as follows :

daip + kta (according to *ktaktavatū niṣṭhā,* 1.1.26)

= *dai + ta* (*p* and *k* = 0 according to 1.3.3 and 1.3.8)

At this stage, the final vowel *ai* in *dai* is substituted by *ā* according to the *sūtra, ādeca upadeśe' śiti* 6.1.45 and we have,

dai > dā + ta

= *dāta.*

Now, the chief condition for the substitution of *ai* by *ā* is that the *avayavin* in question should end in *ec,* i.e. *e,o, ai* and *au.* But if we take the root *dai* as *daip* with *p* forming

an integral part of the *avayavin* (as established by *paribhāṣa* No. 2 above), the root *daip* cannot be said to end in *e, o, ai, and au* and consequently, the final *ai* will not be eligible for the substititon by *ā* and hence the form will not be *dāta.* This shows that to accept the *anubandha* as an integral part of the *avayavin* is wrong.

Nāgeśa refutes this charge by a reference to Pāṇini's own usage of a form. The form here is *māṅaḥ,* a gen. sing. of *māṅ,* which is a derivative from the *ec*-ending root *me,* Pāṇinian *meṅ,* used in the *sūtra, udīcāṁ māṅo vyatīhāre,* 3.4.19. If, Nāgeśa says, the usage of Pāṇini himself is any authority, the substititon of *e* in the root *meṅ* i.e. *me* by *ā* in the form *māṅaḥ* indicates that while taking an *avayavin* as ending in *ec* i.e. *e, o, ai, ay,* the *anubandhas* are not to be counted, though they are part of the *avayavin;* the *paribhāṣa* in this connection is No.4, viz. *nānubandhakṛtam anejantatvam; cf.* Nāgeśa *udīcām māṅa iti nirdeśo'syā jñāpakaḥ.*

The use of the form *māṅaḥ* in the place of *meṅaḥ* by Pāṇini clearly shows that *anubandha* does not come in the way of assuming the roots like *daip, meṅ* etc. as *ec*-ending.

The next problem concerns with the similarity or otherwise of the *avayavins* with or without the *anubandhas.*

The Pāṇinian *sūtra, vā'sarūpo'striyām,* 3.1.94 states that the dissimilar *(asarūpa)* i.e. phonetically non-identical *kṛt-pratyayas* are optionally applicable, except in the *stryadhikāra* in the *kṛdanta*-chapter. If, now, on the authority of this Pāṇinian rule, we take the *kṛt-pratyayas ka* and *aṇ* as dissimilar (since *anubandha* is part of the *avayavin),* we can safely apply *ka* optionally in the place where *aṇ* (according to the *sūtra, karmaṇyaṇ,* 3.2.1) is

applicable, and we can have the form like *dāya* from *dā,* in the usage *godāya,* besides the form *da* in *goda.*

The present *paribhāṣa* No.5, viz. *nānubandhakṛtam asārūpyam,* is an answer to the above problem. It says that the presence of an *anubandha* is not the criterion for deciding the phonetic non-identity or dissimilarity *(asārūpya).* Two elements are taken as dissimilar, only after taking out the *anubandhas.* The *aṇ* and *ka* in the above example are, therefore, fully identical as *-a-* when the two *anubandhas* viz. *ṇ* and *k* are taken out; they, therefore, are totally similar and not dissimilar.

The proof for such an interpretation lies in the Pāṇinian *sūtras* themselves. The *sūtra*, to quote one, is *dadātidadhātyor vibhāṣa,* 3.1.139, which states to apply optionally the *śa* in the place of *ṇa.* We have, therefore, the forms *dada* and *dāya; dadha* and *dhāya.* What this explicit mention of the 'option' *(vibhāṣā)* in the *sūtra* by Pāṇini means is that the pratyayas *ṇa* and *śa* are really not dissimilar, because if they were really so, they could have automatically been applied in the place of each other according to the general Pāṇinian rule, 3.1.94, quoted above. The *pratyayas ṇa* and *śa* are really identical phonetically, when deprived of their *anubandhas ṇ* and *ś* respectively.

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Appendix 2

- Illustriative Examples of the Working of the Pāṇinian Technique of It-zero -

Before presenting the illustrative examples of the working of the Pāṇinian technique of *it*-zero, it would be interesting to know the grammatical categories to which the *it*-sounds are attached by Pāṇini. As we have noted earlier we get that there are in all six grammatical categories which are the basic foundation. It is these six basic categories from which Pāṇini has built up his grammar and generated all the forms and transformations. The six basic grammatical categories, as Patañjali states, are : *prātipadika* (nominal base), *pratyaya* (suffix, termination), *dhātu* (verbal base), *āgama* (tagmeme), *ādeśa* (substitute) and *nipāta*; *cf.* Patañjali on the Pāṇinian *sūtra*, 1.3.3 *(hal antyam) : siddham tu vyavasitāntyatvāt ... vyavasitāntyo hal itsaṁjño bhavatīti vaktavyam. ke punar vyavasitāḥ ? dhātu-prātipadika - pratyaya-nipāta-āgama-ādeśāḥ.* From the category *prātipadika,* Pāṇini generates the nominal declensional, taddhita and feminine formations and the *nāmadhātu* (i.e. denominative) transformational forms; from the category of *dhātu*, he generates the verbal conjugational and *kṛt* formations and the transformational formations of the causal, desiderative, frequentative and the passive. The category of the *prātipadika* is defined by Pāṇini in *arthavad adhātur apratyayaḥ prātipadikam,* 1.2.45 and *kṛttaddhitasamāsāśca,* 1.2.46. The category of *dhātu* is defined by him in *bhūvādayo dhātavaḥ,* 1.3.2 and *sanādyantā dhātavaḥ,* 3.1.32.

The category of the *pratyaya* refers to all the nominal

declensional and verbal conjugational terminations and the feminine, *taddhita* and *kṛdanta* suffixes. The *pratyaya* is defined by Pāṇini in the *sūtra, pratyayaḥ,* 3.1.1. Though Pāṇini uses the same term *pratyaya* for both the types of *pratyayas,* viz. the declensional (called *sup)* and conjugational (called *tiṅ)* terminations (defined respectively in the *sūtras* 4.1.2 and 3.4.78) on the one hand and the taddhita and *kṛdanta* (defined in 4.1.76 and 3.4.67 respectively) on the other, there is yet a difference between the two from linguistic point of view. While the declensional and conjugational terminations are closing *pratyayas,* the feminine, *taddhita* and *kṛdanta* suffixes are non-closing *pratyayas.*[1] Not that Pāṇini was totally unaware of this distinction between the two; he actually terms the declensional and conjugational terminations as *vibhakti; cf.* the *sūtra, vibhaktiś ca,* 1.4.104. But he does not give seperate names for the two types. We have in the present work rendered the *sup* and *tiṅ* i.e. *vibhakti pratyayas* by the term 'termination', because they 'terminate' i.e. 'close' the form, and the *taddhita* and *kṛdanta pratyayas* by the term 'suffix', because they are attached afterwards i.e. after the *prātipadika (cf.* the *sūtra paraḥ,* 3.1.2)

The category of *nipāta* is defined by Pāṇini in the *sūtra, prāgrīsvarān nipātāḥ,* 1.4.56. The *sūtra* means that all the categories which are noted down from this *sūtra* onwards upto the *sūtra, adhir īśvare,* 1.4.97 are to be known by the term *nipāta*. There are thus in all 42 *sūtras* which enlist the *nipātas.* The *nipātas* are enumerated in the *svarādigaṇa*

1. For a detailed discussion, *cf. M. D. PANDIT, A Concordance of Vedic Compounds Interpreted by Veda,* CASS, University of Poona, Pune, 1989, Vol. I Section I.

mentioned in the *sūtra, svarādinipātam avyayam,* 1.1.37. The *svarādigaṇa* is an *ākṛtigaṇa* i.e. open, in the sense that many other words can also be included in the group. According to *gaṇapāṭha,* however, it specifies in all 73 words as *nipātas.* The *phiṭ-sūtra, nipātā ādyudāttāḥ,* states that all the *nipātas* accent on the first i.e. initial syllable.

The remaining two categories of *vyavasitas,* viz. the *āgama* and the *ādeśa*, are, however, neither defined nor enumerated by Pāṇini anywhere in his grammar. We have to know them only through the grammatical procedures given by Pāṇini and through the commentories on Aṣṭādhyāyī.

The most interesting feature to be noted about all the above six categories of *vyavasitas* and the technique of *it-saṁjñā* is that excepting the category of *nipāta*, all the five categories viz. *dhātu, prātipadika, pratyaya, āgama* and *ādeśa*, are accompanied by *it*-sounds which have specific function to perform in the grammatical procedure to arrive at the usable form. We have included here the categories of *vibhaktipratyaya* (terminations), the *pratyaya* (suffixes), *āgama* and *ādeśa* in one group for the sake of convenience of presentation. The two categories of the *dhātu* and the *prātipadika* are presented independently. The category of *nipāta* does not provide any example of an *it*-sound attached to any *nipāta*. It is, therefore, excluded from presentation.

The definition of the category of *prātipadika,* viz. 1.2.45 and 46 is of procedural type or is what BERTRAND RUSSELL calls as 'a definition by intension'. The definitions of the *dhātu, pratyaya* and *nipāta* are of enumerative type,

or are what are called as 'definition by extension'[2].

We have also seen before that *it*-zero is always a potent zero since it is brought about by the word *lopa;* as such, even after its zero, it has, according to the *sūtra, pratyayalope pratyayalakṣaṇam,* 1.1.62, full powers to bring about the required operational, morphological, phonological and/or accentual modifications in the formative process of generating the usable form from the basic duo *prakṛti* and *pratyaya*. The present Appensix 2 illustrates in detail the working of the *it*-zero in different categories and spheres.

1. ***It*-zero in the *prayaya*** (including suffixes, terminations, *āgama* and *ādeśa*)

1.1 There are certain terminations like the nom-sing. *su* which have certain vocalic sounds as *it*. But they are not invested with any power of modifications. We, therefore, start with the consonantal *it*-sounds.

1.2 Suffix/termination with *k* as *it* :- The *it*-sound *k* is invested with different powers of modifications in different spheres.

1.2.1 *k* as *it* in the sphere of verbal formations and derivatives:-

The terminations which have *k, g* and *ṅ* as *it*-sounds have no power of bringing about the phonological change of *guṇa* and *vṛddhi*. The Pāṇinian *sūtra* which deprives *k*

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2. *cf.* BERTRAND RUSSELL, *Introduction to Mathematical Philosophy,* p. 12.

of the power of *guṇa* and *vṛddhi* is *gkṅīti ca*[3], 1.1.5. It should be noted here this power of nullification of bringing about any *guṇa* and *vṛddhi* in the stem is restricted only to the sphere of verbal conjugation and primary derivatives.

Another function which is ascribed to the *k-it* sound is that the verbal stem gets an augment i.e. *āgama t* i.e. *tuk* before applying the *kit*-suffix. This function is restricted only to the sphere of *kṛt*-derivatives. The *sūtra* is : *hrasvasya piti kṛti tuk,* 6.1.71.

A third function which is assigned to *k* as *it* is that if a suffix or augment is *kit,* it is applied at the end of the stem to which it is applied. The *sūtra* is : *ādyantau ṭakitau,* 1.1.46.

The best example illustrating all the purposes of *k* as *it* is provided by the *kṛt*-formation *stutya* from √*stu.* The suffix is *kyap* i.e. with *k* as *it* according to the *sūtra* 3.1.109. The procedure is :-

stu+kyap

= *stu+ya (k=o; p* = o)

= *stu+t+ya (t* added to *stu)*

= *stutya.*

Since *k* prohibits the *guṇa* or *vṛddhi,* the root *stu* does not change to *sto;* since *k* states the application of the *āgama tuk* i.e. *t* and that too at the end, the stem *stu* changes to *stut* and the formation is *stut+ya = stutya* and

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3. The *Sūtra* is generally read as *kṅiti ca,* the initial *g* being merged in *saṁdhi* with the following *k, cf.* BD : *git-kit-ṅin-nimitte ig-lakṣaṇe guṇavṛddhī na staḥ; cf.* also Tattvabodhinī : *kṅiti ca iti sūtre cartvena gakāro'pi praśliṣyate ity āśayena git - kin - ṅin - nimitta ity uktam.*

not *stotya* or *stoya* etc.

This is the case in the sphere of *kṛt-* formation; the same procedure can be applied to the verbs in getting their conjugated forms.

Pāṇini has played another trick in the case of *k* as *it*. There are cases in his grammar where the suffix in question has no *k*-sound anywhere which can be made an *it;* but Pāṇinian technique demands for the sake brevity that there should not be any *guṇa* or *vṛddhi*. Nor again he states in its place a separate suffix which is *kit*. What he does in such cases is that he states that the suffix which is given in the *sūtra* should be treated as *kit* even though it contains no *k*. This is the case with the suffix *yā,* Pāṇinian *yāsuṭ (cf.* the *sūtra*, 3.4.103) which does not contain any *k* and hence is not *kit,* but which is made to behave as a *kit* suffix according to the special rule, *kid āśiṣi* 3.4.104. Hence it does not bring about any *guṇa* or *vṛddhi* in the stem, as, for example, in the form *bhūyāt,* bened. 3rd pers. sing. of √*bhū*. Thus,

bhū+tiṅ (according to 3.4.78)

= *bhū+ti* (*ṅ*=o)

bhū+t (*i*=o, according to *itaśca,* 3.4.100)

bhū+yā+t

= *bhūyāt.*

In the absence of the rule 3.4.104 quoted above, the form would have been *bhoyāt* with *guṇa* of *u* into *o*.

There is yet another function ascribed to *k* as *it* attached to an *āgama* or augment. An *āgama* is different from *pratyaya* in that while the latter is a linguistically

meaningful category, the former is devoid of any linguistic meaning. But actually from linguistic point of view, the lines of demarcation between an *āgama* and *pratyaya* are very thin; *cf.* for example, the *āgama yāsuṭ* given above. Though it is given as an *āgama* by Pāṇini and is termed as such by all commentators (*cf.* BD. on 3.4.103 : *yāsudāgamaḥ syāt),* it does convey the sense of benedictive because it is applied only in the benedictive. Yet, from Pāṇini's point of view, the two categories of *āgama* and *pratyaya* are different. Though Pāṇini has not stated the distinction between the two, we can distinguish the two categories on the technical plane on the basis of Pāṇinian technique. What Pāṇini has done is that while the *āgamas* are accompanied with only the *it*-sounds *t,k* and *m,* the *pratyayas* are accompanied by any *it*-sounds. Thus, the *it*-technique tells us that the *āgamas* get only *t,k* and *m* as the *it*-symbols; no other *it*-symbol is found in the case of the *āgamas.* The illustration furnished by the *it*-sound *k* in the case of *āgamas* is the same as the one given above in the case of the form *stutya* or *bhūyāt.* The *kit*-character of an *āgama* prescribes for it the final position according to the *sūtra, ādyantau ṭakitau,* 1.1.46. Since in the above example of *stutya,* the *āgama tuk* i.e. *t* is *kit,* it is applied at the end of the *dhātu stu,* changing it to *stut* and then the *prayaya* is applied. So also, in the case of *yāsuṭ* which is *kit* according to *kid āśīsi,* 3.4.104, it comes at the end of the *dhātu bhu;* thus we have, first, *bhūyā* and then the termination *t* is applied.

The statement that *āgamas* always get only *t,k* and *m* as the *it*-sounds should not be taken to mean that all the categories which get these sounds as *it* are *āgamas.* The

convese is not true here. There are *pratyayas* with *t,k,* and *m* as *it*-sounds attached to them as we have seen above in the case of the *pratyaya kyap.*

1.2.2. The story of *k* as *it* is, however, different in the sphere of the *taddhita*-formations. Unlike the *k* in the sphere of *kṛt*-formations, the *k* as *it* in the sphere of *taddhita* formations is invested with the power of bringing about the *vṛddhi* of the vowel in the stem. The Pāṇinian *sūtra* is : *kiti ca,* 7.2.118.

Also, the *kit*-character in the *taddhita*-sphere empowers the suffix to accent on the last syllable of the formation thus formed. The *sūtra* is : *kitaḥ*, 6.1.165.

The following illustration of the form *āgneya* from the noun *agni* will clearly show both these functions :-

agni+ḍhak (cf. agner dhak, 4.2.33)

āgni+ḍha (vṛddhi of *a* into *ā* and *k* = o)

= *āgni+eya (dha > eya* according to 7.1.2)

= *āgn+eya (i*=o; *cf. yasyeti ca,* 6.4.148)

= *āgneya*

= *āgneyá,* with *udātta* accent on the final; *cf.* VS.24.1;29.58 etc.

1.3 *kh* as *it :*

The function ascribed to *kh* as *it* is to shorten the final, long vowel of the first member of a compound whose second member is a formation in a *khit*-suffix. The Pāṇinian *sūtra* is *khity anavyayasya,* 6.3.66. The example for this is provided by the compound *nāḍindhama,* dissolved as *ñaḍīn dhamati iti;*. The first member *nāḍī* ends with a long

vowel and the second member *dhama* is a *kṛt*-formation from √*dham* with the *khit* suffix *khaś* i.e. *a*, according to the *sūtra*, *nāḍīmuṣṭyoś ca*, 3.2.30. The procedure is :-

nādī + dhama

= *nādī+m+dhama* (*m* inserted according to 6.3.67)

= *nāḍi+m+dhama* (long *ī* > short *i*)

= *nāḍimdhama*

= *nāḍindhama* (*m* > *n* according to the rule of *parasavarṇa*)

There are no *khit*-suffixes any where in any other sphere.

1.4 *g* as *it*:

There is only one, solitary example in the whole of *Aṣṭādhyāyī* of a *git*-suffix and it is the suffix *gṣnu* given by the *sūtra*, *glājisthaś ca gsnuḥ*, 3.2.139. The function of *g* as *it* is to nullify the operation of *guṇa* and *vṛddhi*; *cf. gkṅiti ca*, 1.1.5 discussed above. The example is provided by the form *jiṣṇu* from √*ji+snu* : Thus,

ji+gsnu (*cf.* 3.2.139)

= *ji+snu* (*g*=o)

= *jiṣṇu* and not *jeṣṇu* (*cf.* 1.1.5)

g as *it* nowehere occurs in any other sphere.

1.5 *gh* as *it* :

The *it*-sound *gh* is ascribed the function of bringing about the velarisation of palatal sounds *c* and *j* in the stem. The *sūtra* is : *cajoḥ ku ghiṇyatoḥ*, 7.3.52. The example is the form *mārga* from *mṛj+ghañ* i.e. *a* according to *halaś*

ca, 3.3.121. This function is available only in the sphere of *kṛt*-formations. Thus,

mṛj+ghañ (cf. 3.3.121)

= mārj+*a (gh* and *ñ* both = zero; *vṛddhi* because of *ñ* as *it* according to 7.2.114, *mṛjer vṛddhiḥ)*

= *mārg+a (j > g; cf.* 7.3.52)

= *mārga.* In the absence of the rule, the form would have been *mārja.*

1.6. *ṅ* as *it :*

Like the *kit* and *git* suffixes above, the *ṅit* suffix also prohibits the *guṇa* and *vṛddhi* in the stem; *cf.* the *sūtra, gkṅiti ca,* 1.1.5. This rule applies only in the spheres of verbal conjugation and *kṛt*-formations. Thus,

√*tṛṣ+najiṅ* (according to *svapitṛṣor najṅ,* 3.2.172)

= *tṛṣ+naj (i* and *ṅ* =o)

= *tṛṣṇaj.* In the absence of this rule, the form would have been *tarṣṇaj.*

The trick which Pāṇini employed in the case of *k* as *it,* viz. even though the suffix in question (viz. *yāsut)* does not contain *k* as *it,* it should be treated as *kit (cf.* the *sūtra,* 3.4.104), is employed in the case of the *it*-sound *ṅ* also. He expressly states that the suffix *yāsuṭ* should be treated as *ṅit,* even though it does not contain any *ṅ* as *it; cf.* the *sūtra, yāsuṭ parasmaipadeṣūdātto ṅic ca,* 3.4.103. The purpose served by such a statement is to emphasize that "the operations required by a particular anubandha - *letter* donot sometimes take place, when the affix having that

anubandha - letter is replaced by another which has it not ?[4]. *cf.* BD. *ṅittvokter jñāyate 'kvacid anubandhakārye' py analvidhāv iti pratiṣedha' iti.*

There is yet another function attached to the *it*-sound *ṅ*. And it is in the sphere of the *ādeśas* i.e. substitutes. If an *ādeśa* is *ṅit,* then even if it contains more than one sound it is to be substituted only in the place of the final part of the category for which it is given. The Pāṇinian *sūtra* is: *ṅic ca,* 1.1.53 *cf.* BD : *ayam apy antyasyaiva syāt.* The example is provided by the *ādeśa, ānaṅ* (= only *ā,* with *n* and *ṅ* becoming zero) which is stated for the *ṛ*-ending nominal stems in compounds. The *sūtra* is : *ānaṅ ṛto dvandve,* 6.3.25. Thus, in compounding the words *mātṛ & pitṛ,* the procedure is :

mātṛ + pitṛ + au.

= *mātā + pitṛ + au (ṛ > ā* i.e. *ānaṅ)*

= *mātāpitarau.*

The Pāṇinian rule 1.1.53 is an exception to the general rule for *ādeśas,* viz. *anekāl śit sarvasya,* 1.1.55, which states that an *anekāl* (i.e. containing more than one sound) *ādeśa* replaces the whole *sthānin.*

1.7. *c* as *it :* The function ascribed to *c* as the *it*-sound of a *pratyaya* is of shifting the accent of the whole form to the last syllable. Thus, the function of *c* is in the sphere of accent only. No other function is ascribed to it in any other sphere. This function works well in all the spheres of declension, conjugation etc. and has no exception. The Pāṇinian *sūtra* is : *citaḥ,* 6.1.63. The example is provided

4. *cf. S. C. Basu, Siddhānta Kaumudī,* Vol. II, p. 24.

by the form kartā́ nom. sing of the root-noun *kartṛ* from *kṛ+the kṛt*-suffix - *tṛ,* which is designated by Pāṇini as *tṛc (cf.* the *sūtra, ṇvultṛcau,* 3.1.133). The process is :

kṛ+tṛc

= *kar+tṛ.*

= *kartṛ*

kartṛ́, accented on the last syllable.

1.8 *ch* as *it :*

There is no termination/suffix/ *āgama/ādeśa* which has *ch* as *it.* In the sphere of *taddhita,* the *ch* is substituted by *īy* according to the *sūtra,* 7.1.2. It has no grammatical function attached to it though it can be termed as *it* according to *cuṭū,* 1.3.7.

1.9. *j* as *it*

There are only two terminations which are *jit;* they are *jas* i.e. *as* of non. plu. and *jus* i.e. *us* of pot. 3rd pers. plu. But in both these cases, no grammatical function is prescribed for them. The only function that both of them perform is to distinguish themselves from other homophonous suffixes.While the *j* in *jas* distinguishes itself from the *as* of abl., gen. sing. which is stated by Pāṇini as *ṅasi* and *ṅas* respectively, the *j* in *jus* distinguishes itself from the *us* of the perf. 3rd per. plu. which is reconstructed by Pāṇini as simply *us* without any *it*-sound; *cf.* 3.4.82.

1.10. *jh* as *it :*

There is only one termination which is technically *jhit* and it is *jhi,* pres. 3rd pers. plu. stated by Pāṇini in 3.4.78. But the *jh* is replaced by *ant (cf. jhon'taḥ,* 7.1.3) in the pres., and by *us* in the pot. The sound *jh* as *it* is, therefore, without any function.

1.11. *ñ* as *it* :

The sound *ñ* has two types of function ascribed to it : (i) to bring about the phonological modification of *vṛddhi* in the stem and (ii) to effect accentual variation.

1.11.1. *vṛddhi* - modification :

There are in all three *sūtras* which lay down the function of *vṛddhi* for the *it ñ*. They are meant to operate in different spheres. The three *sūtras* are :

(i) *aco ñṇiti*, 7.2.115 (ii) *ata upadhāyāḥ*, 7.2.116 and (iii) *taddhiteṣvacām ādeḥ*, 7.2.117. While the *sūtra*, 7.2.115 states the vrddhi of the final vowel, the *sūtra*, 7.2.116 states the *vṛddhi* of pen-ultimate vowel and the *sūtra*, 7.2.117 lay down the *vṛddhi* of the initial vowel only. While the *sūtras* 7.2.115 and 7.2.117 prescribe *vṛddhi* for all vowels satisfying the conditions, the *sūtra*, 7.2.116 prescribes it only for the vowel *a*. Moreover, while the scope of the *sūtras*, 7.2.115 and 7.2.116 embraces the spheres of nominal declension, verbal conjugation and the *kṛdanta* derivation, the *sūtra*, 7.2.117 is limited only to the sphere of the *taddhita* derivation. The following examples can be cited :-

1.11.1.1. *aco ñṇiti*, 7.2.115. The *sūtra* lays down that the *it*-sounds *ñ* and *ṇ* bring about the *vṛddhi* of the final vowel of the *aṅga*[5] in the stem. This rule is invariably

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5. *aṅga*, defined in 1.3.13 *(yasmāt pratyayavidhis tadādi pratyaye aṅgam)*, is a peculiar morphemic category invented by Pāṇini. The term refers to that part of the stem from which the application of the *pratyaya* starts. Thus in the form *hareḥ* (gen. sing. of *hari) hari* is the prātipadika, while *hare*, a modification of *hari* in the situation *hare + as*, is the *aṅga*. Thus, there is a difference between a *prātipadika* and an *aṅga*.

applicable in all the spheres. Let us take the example of the *kṛt*-formation *cāya* from √*ci*. The procedure is :

ci+ghañ (cf. 3.3.20)

= *cāy+ghañ (vṛddhi* according 7.2.115)

= *cāy+a (gh* and *ñ* both zero)

= *cāya.*

Examples can be quoted from other spheres also.

1.11.1.2 : *ata upadhāyāḥ,* 7.2.2116 :

This *sūtra* empowers the *it ñ* to bring about the *vṛddhi* of the penultimate vowel a. This *sūtra* also works in all the spheres of nominal declension, verbal conjugation, *taddhita* and *kṛdanta* formations. Thus we have,

pac+ghañ (cf. 3.3.18)

= *pāc+ghañ (vṛddhi* of penultimate *a* into *ā, cf.* 7.2.116)

= *pāc+a (gh* and *ñ*=o)

= *pāk+a (c > k* according to 7.2.52)

= *pāka.*

1.11.1.3. *taddhiteṣv acām ādeḥ,* 7.2.117

This *sūtra* invests in *ñ* the power of bringing about *vṛddhi* of the first vowel in the *aṅga.* Thus,

utsa+añ (cf. 4.1.86)

= *autsa+añ (vṛddhi* of the first vowel; *cf.* 7.2.117)

= *autsa+a (ñ=o)*

= *auts+a* (final *a*=o according to 6.4.148)

= *autsa.*

Thus we find that the same *it*-sound brings about the same function of *vṛddhi* differently in different spheres. The *it*-sound *ṇ* functions in the same way as that of *ñ.*

1.11.2. Accentual variation :

The *sūtra, ñnityādir nityam,* 6.1.197, states that the formations formed by applying the *ñit* and *nit* terminations are accented on their first vowel. The example is provided by the word *paumsya* from the nominal base *puṁs* (= 'male') with the *ñit* suffix *ṣyañ,* i.e. *ya* with *ṣ* and *ñ* becoming zero. Thus,

puṁs+ṣyañ (cf. 5.1.123; 124)

= *pauṁs +ya (vṛddhi* of *u* into *au* according to 7.2.117)

= *pauṁsya*

= *paúmsya;* for accent *cf.* RV. 1.5.9; 80.10 etc.

1.12 *ṭ* as *it* :

1.12.1 According to the *sūtra*, 4.1.15, the formations which are formed by applying the *ṭit* suffixes form their feminine with the feminine suffix *ī* (i.e. Pāṇinian *ṅīp)* and not with *ā.* Take the formation *cara* from √ *car* with the *ṭit* suffix *ṭa* i.e. *a* according to the *sūtra, careṣ ṭaḥ,* 3.2.16. Thus *car+a = cara.* Now, since the formation ends in *-a,* the feminine form should, according to the Pāṇinian technique, actually be *carā* according to the *sūtra, ajādyataṣ ṭāp,* 4.1.4. But since *cara* has a *ṭit* suffix, the feminine formation is *carī.* This rule works only in the field of feminine formations, and that too, if the *ṭit* category is a suffix.

1.12.2. If the *ṭit* category is an *āgama*, the rule *ādyantau ṭakitau,* 1.1.46, states that the *āgama* is applied in the initial position to the category for which it is laid down. Thus, the *āgama aṭ*, which is *ṭit* and is applied to the *dhātus* in the *anadyatana* past, is applied before the *dhātu*. The *sūtra* for the *āgama* is *luṅlaṅlṛṅkṣv ad udāttaḥ,* 6.4.71. The procedure is :

bhū+śap+laṅ

= *a+bhū+śap+ti* (*a* according to 6.4.71 and 1.1.46)

= *a+bhū+śap+t*

= *a+bhav+a+t*

= *abhavat; aṭ* occupies the initial position of *bhū.*

1.12.3. If the *ṭit* category happens to be one of the five *ṭit lakāras,* viz. *laṭ, lit, luṭ, lṛṭ* and *leṭ* representing the various tenses and moods, the *ṭit* character of the tense or mood changes the *i* of the conjugational terminations into *e* in the case of the *ātmanepada.* Thus,

edh (ātmanepadin)+laṭ

= *edh+śap+ti*

= *edha+ti*

= *edha+te* (*i* > *e,* according to 3.4.79)

= *edhate.*

The *sūtra,* 3.4.79 reads as : *ṭita ātmanepadānām ṭere.*

1.13. *ṭh* as *it* :

There is no *ṭhit* suffix in the fields of terminations, nominal declension, verbal conjugation and *kṛdanta* formations. The section of *taddhita* formations, however,

presents an example of the suffixes *ṭhak, ṭhan* etc. But the *ṭh,* though *it,* is replaced by *ik* according to 7.3.50 *(ṭhasyekaḥ)* and hence the *ṭhit* character of the suffix is meaningless so far as its bearing on bringing about any grammatical modifications is concerned.

1.14. *ḍ* as *it:*

The *Pāṇinian sūtra, ṭeḥ,* 6.4.155 lays down that the *ḍit* character of a suffix/termination brings about the zero of the *ṭi*-category (defined in *aco'ntyādi ṭi,* 1.1.64) of the stem. The working is visible in the example of the form *bhavitā,* 1st future, 3rd pers. sing. of √*bhū.* The termination in this case is *ḍā,* which replaces the *luṭ.* The procedure is :

bhū+luṭ

= *bhū+tās+luṭ (tās* added according to 3.1.33)

= *bhū+iṭ+tās+luṭ (iṭ* according to 7.2.35)

= *bhū>bho>bhav+iṭ+tās+luṭ*

= *bhav+iṭ+tās+ḍā (luṭ* replaced by *ḍā; cf.* 2.4.85)

= *bhav+i+tās+ā*

= *bhav+i+t+ā (ās* in *tās,* the *ṭi > o* according to 6.4.155)

= *bhavitā.*

In the absence of the zero of the *ṭi, ās,* the form would have been *bhavitāsā.*

1.15. *ḍh* as *it*:

As in the case of *ṭh,* the *ḍh* as *it* is available only in the case of the *taddhita* formations in suffixes like *ḍhak*

and *ḍhrak*. But, it is replaced by *ey* according to 7.1.2. Hence the *ḍhit* character is meaningless.

1.16. *ṇ* as *it* :

So far as the grammatical operation is concerned, the *it*-sound *ṇ* performs the same function of modification as that of the *it*-sound *ñ* discussed above, and the function is of bringing about the *vṛddhi* in the stem. The *sūtras* in the case of *ṇ* as *it* are also the same as quoted and discussed above, viz. 7.2.115, 116 and 117.

1.16.1. Example for 7.2.115 *(aco ñṇiti)* : The form is *kārya, kṛt*-formation from √*kṛ*+the *ṇit* suffix *ṇyat* i.e. *ya.*

Thus,

kṛ+ṇyat (according to *ṛhalor ṇyat,* 3.1.124)

= *kār+ṇyat (vṛddhi* of *ṛ* into *ār, cf.* 7.2.115)

= *kār+ya (ṇ* and *ṭ* both zero)

= *kārya.*

1.16.2. Example for 7.2.116 (ata *upadhāyāḥ)* :

The form *yājya, a kṛt* formation from the verbal base *yaj* is a good example. The suffix in this case also is *ṇyat* (i.e. *ya)* which is *ṇit.* Thus,

yaj+ṇyat (cf. 3.1.124)

= *yāj+ṇyat (vṛddhi* of penultimate *a* into *ā* according to 7.2.116)

= *yāj+ya*

= *yājya.*

1.16.3. Example for 7.2.117 *(taddhiteṣv acām ādeḥ)*

The form *śaiva,* a *taddhita* formation from the nominal base *śiva* is a good example. The suffix in this case is *aṇ* (i.e. *a)* which is *ṇit* according to the *sūtras, śivādibhyo'ṇ,* 4.1.112 and *tasyāpatyam,* 4.1.92, applied in the sense of 'his/her child'. The procedure is :

śiva+aṇ

= *śaiva+a (vṛddhi* of the first vowel of *śiva* viz. *i* into *ai* according to 7.2.117)

= *śaiva.* (final *a* of *śaiva*=o according to 6.4.148)

1.16.4 : As in the case of the *it*-sounds *k* and *ṅ* discussed before, in the case of the *it*-sound *ṇ* also, Pāṇini uses the same technique of terming a suffix/termination as *ṇit* even though it does not even contain the sound *ṇ;* by this he wants to bring about the modification of *vṛddhi.* This is the case especially with the first five terminations of nominal declension, viz. *su, au, jas, am* and *auṭ,* which are called as *sarvanāmasthāna (cf.* the *sūtra, suḍ anapuṁsakasya,* 1.1.43). The *sūtra* which states these terminations as *ṇit* explicitly is, *sakhyur asambuddhau,* 7.1.92. The nominal base in question, in whose case the above five terminations should be treated as *ṇit,* is *sakhi.* Let us take the nom. du. termination *au* and illustrate the working of 7.1.92. The procedure is :

sakhi+au

= *sakhāy+au (vṛddhi* of *i* into *au* according to 7.2.115)

= *sakhāyau.*

1.17 t as it :

The *tit* character of the suffix brings about the variation in accent, viz. the *tit*-suffix gets circumflex (svarita) accent

according to the *sūtra, tit svaritam,* 6.1.185. Thus in *vārya,*

√*vṛ+ṇyat*

= *vār+ya*

= *vārya*

= *vāryà; cf.* 6.1.185.

1.18. *th* as *it* : There is no termination/suffix with *th* as it.

1.19. *d* as *it :* There is no termination/suffix with *d* as *it.*

1.20. *dh* as *it* : There is no termination/suffix with *dh* as *it.*

1.21. *n* as *it :*

The only function that is ascribed to *n* as *it* is that it shifts the accent from the final syllable to the first syllable of the form formed with a *nit*-suffix. Its function in this regard is identical with that of *ñ* as *it* discussed before. The Pāṇinian *sūtra* is *ñnityādir nityam,* 6.1.197. Thus in the formation *svapna* (from √*svap+the nit*-suffix *nan,* according to *svapo nan,* 3.3.91), we get the accent as -

svap+nan

= *svap+na*

= *svapna*

= *svápna; cf.* RV. 2.15.9; 28.10. etc.

In the absence of this *sūtra,* 6.1.197, however, the accent would have been on the last syllable, as *svapná* according to the general rule of suffixal accent, viz. *ādhyudāttas' ca,* 3.1.3.

1.22. *p* as *it* :

Many *pit* suffixes and terminations are available in all the sections of Panini's grammar. The sound *p* as *it* performs two types of function. First, it nullfies the *udātta* accent on itself; cf. the *sūtra, anudāttau, suppitau,* 3.1.4. Secondly, it adds an *āgama t* i.e. Paninian *tuk, cf.* the *sūtra, hrasvasya piti kṛti tuk,* 6.1.71.

1.22.1 Example of accentual function :

Take the form *bhavati,* pres-3rd pers. sing. of √*bhū.*

The process is :

bhū+śap+tip

= *bhav+a+ti*

= *bhavati.*

At this stage, the accent should normally have been on the final *i* according to 3.1.3. But as the termination *ti* is *pit* (=Pāṇinian *tip),* it is *audātta* according to 3.1.4; it, therefore, throws back the accent on the previous syllable viz. the *vikaraṇa a;* But even this *a* i.e. śap is again *pit.* The accent again is thrown back on the preceding *a* of *bhav,* and the accent of the total form *bhavati* is *bhávati; cf.* RV 1.28.1; 9.5.1 etc.

1.22.2 : The example of the *pit*-character ordaining the *āgama t* i.e. *tuk* is *stutya* which is discussed before.

1.23. *ph* as *it :*

There is no suffix/termination which is *phit.*

1.24. *b* as *it :*

There is no suffix/termination which is *bit.*

1.25. *bh* as *it :*

There is no suffix/termination which is *bhit.*

1.26. *m* as *it :*

There are no suffixes/terminations which are *mit.* Only some *āgamas* like *mum* (i.e. *m)* are *mit* and provide with examples. The example *nāḍiṁdhama* discussed before shows that the *āgama mum* is applied by the *sūtra,* 6.3.67 *(arurdviṣadajantasya mum)* after the last vowel of the word for which it is laid down. The *sūtra* is : *mid aco'ntyāt paraḥ,* 1.1.47. The *mum* in *nāḍimdhama* is laid down for the vowel-ending *(ajanta)* word *nāḍī;* it is, therefore, applied after the last vowel, viz. long *ī* of *nāḍī.* The *mit* character thus indicates the position where the *āgama* is to be applied.

1.27. *y* as *it :*

There is no suffix/termination with *y* as *it.*

1.28. *v* as *it :*

There is no suffix/termination with *v* as *it.*

1.29. *r* as *it :*

The *rit* character of the suffix/termination has a bearing on the accent of the form. The *sūtra, upottamaṁ riti,* 6.1.217, lays down that the form, formed by applying a *rit* suffix, gets its accent on the syllable which is immediately prior to the last syllable, that is so to say, the penultimate syllable. Thus, the form *āhavanīya* is formed from *ā + √hu* with the *rit* suffix *anīyar (cf.* the *sūtra,* 3.1.96). It is therefore, accented on the long *ī* of *nī* which forms the penultimate syllable or vowel, the last syllable being the final *a* of *ya.* The accented form is *āhavanī́ya; cf. Kāṭhaka Saṁhitā,* 7.13; *Taittirīya Saṁhitā,* 1.6.7.1. It

thus indicates the place of accent. The syllable prior to the penultimate syllable is called *upottama.* The term *upottama* is, however, nowhere defined by Pāṇini, who defines the penultimate sound as *upadhā* in *alo'ntyāt pūrva upadhā,* 1.1.65.

1.30. *l* as *it* : The function assigned to the sound *l* as *it* is that the vowel which is immediately prior to the suffix/termination is accented; *cf.* the *sūtra, liti,* 6.1.193. The example is provided by the form *babhūva,* perf. 3rd pers. sing. of √*bhū;* the temination is *ṇal* i.e. *a* which is *lit.* Hence the accent falls on the vowel which is immediately prior to the termination *a.* The accent is on long *ū* of the reduplicated base *babhū,* as *babhūva; cf.* RV. 2.12.9 etc.

1.31. *ś* as *it :*

1.31.1. The characteristic feature of the *śit* suffix/ termination is that the *lakāras* or tenses and moods in Sanskrit get the title *sārvadhātuka* if the *vikaraṇa* which is applied to the *dhātus* in that case is *śit.* Thus, the four *lakāras* viz. *laṭ* (pres.), *loṭ* (imper.) *laṅ (anadyatana* past) and *vidhiliṅ* (Pot) get the different *śit vikaraṇas* of the different conjugations. Hence these four *lakāras* are called *sārvadhātuka* tenses. The sūtra is : tiṅśitsārvadhātukam, 3.4.113

1.31.2. If, however, the category which has *ś* as *it* happens to be an *ādeśa* i.e. a substitute, the rule in such cases is that a *śit ādeśa* takes the place of the *sthānin* as a whole and not in parts. The *sūtra* is *anekāl śit sarvasya,* 1.1.55. The example is the acc. plu. of the noun *aṣṭan,* eight. The procedure is :

aṣṭan + śas acc.plu.termination)

= *aṣṭa+as (aṣṭan > aṣṭa* according to 7.4.84)

At this stage, the *sūtra, aṣṭābhya auś,* 7.1.21 lays down the *ādeśa, auś* which is *śit* for the nom./acc. plu. terminations *jas* and *śas* (both of which, devoid of the *it*-sounds *j* and *ś* become only - *as*). The *ādeśa* being *śit* takes the place of the whole terminations and we have,

aṣṭa+au, and the final form is *aṣṭau.*

1.32. *ṣ* as *it :*

The function ascribed to the sound *ṣ* as *it* is only in the sphere of feminine formations. The Pāṇinian *sūtra, ṣid gaurādibhyaś ca,* 4.1.41 lays down that any nominal formation formed with a *ṣit* suffix forms its feminine in long *ī,* Pāṇinian *ṅīṣ,* and not with *ā* (even if it ends in *a,* which is a regular process according to *ajādyataṣ ṭāp,* 4.1.4). Take the form *nartaka,* from √*nṛt* with the *ṣit* suffix *ṣvun* according to *śilpini ṣvun,* 3.1.145. The feminine of *nartaka* is *nartakī* with *ṅīṣ* and not *nartakā* with *ṭāp.*

1.33. *s* as *it :*

The *sit* character of the suffix/termination terms the previous *prātipadika,* to which it is applied, as *pada;* the *sūtra* is *siti ca,* 1.4.16; *cf.* BD. *siti pare pūrvam padasaṁjñaṁ syāt.* In effect, this rule implies that the previous *prātipadika* is not to be termed as *bha* defined in *yaci bham,* 1.4.18. This nomenclature of *pada,* instead of *bha,* given to the *prātipadika,* nullifies two operations, viz. (i) it prohibits the *guṇa* of the vowel in the stem, and (ii) it nullifies the zeoring of the sounds *a, ā, i* and *ī* in the stem, both of which would otherwise have taken place if the *prātipadika* would have been termed as *bha.* The following examples can be cited :

1.33.1. Example for prohibition of *guṇa :*

The word *ṛtviya* is formed from the noun *ṛtu* with the *sit* suffix *ghas (> iya cf.* 7.1.2) laid down in the *sūtra, chandasi ghas,* 5.1.105. The noun *ṛtu,* therefore, gets the *padasaṁjñā* which prohibits the *guṇa* of *ṛ* in *ṛtu* and the form is : *ṛtu+iya = ṛtviya* and not *artviya.*

1.33.2. Example for nullifying the zero :

Take the form *ūrṇāyu* from the noun *ūrṇā* with the *sit* suffix *yus* i.e. *yu* according to *ūrṇāyā yus,* 5.2.123.

Now since, because of the *sit* character of the suffix *yus,* the noun *ūrṇā* gets the *padasaṁjñā,* the final *ā* is not lost and the form is *(ūrṇā+yu=) ūrṇāyū.* In the absence of such a rule for *padasaṁjñā,* the noun *ūrṇā* would have got the nomenclature of *bha* and the final *ā* would have been zero according to the *sūtra, yasyeti ca,* 6.4.148 with the result that the form would have been *ūrṇyu* and not *ūrṇāyu.*

1.34. *h* as *it :*

There is no suffix/termination which has *h* as *it.*

2. *It*-zero in the *dhātus :*

As we have seen before, the peculiarity of the *it*-sounds in the sphere of the *dhātus* is that with the exception of some consonantal sounds, all are choosen from the group of vowels.Another peculiarity is that besides the single-sound *it*-sounds Panini has also employed some — in all four — double-sound *it*-sounds. And we have these two broad categories for the convenience of presentation.

2.1. Single sound *it*-sounds : The vowels employed by Pāṇini as *it* are in all ten. They are *a, ā, i, ī, u, ū, ṛ, ḷ, e* and *o.* Of the consonantal sounds, the seven sounds *k, ṅ, ñ, ṭ, ṇ, p* and *ṣ* act as *it*-sounds. The remaining sounds

of the alphabet are not used as symbols at all.

2.1.1. *a* as *it* :

The number of roots in the *dhātupāṭha* of nearly 2000 roots, which have *a* as the *it*-sound forms more than half part of the total. Yet the *it*-sound has not been assigned any specific grammatical function to perform. It, therefore, seems to have been used merely for the sake of pronunciation, as is clear from the fact that no root is basically given in the *dhātupāṭha*[6] as ending in a consonant. Generally, barring some cases in which special rules are framed, all the *adit* roots are to be conjugated according to the general rules of verbal conjugation.

2.1.2. *ā* as *it*

The Pāṇinian *sūtra āditaśca,* 7.2.16 prescribes that the roots with the sound *ā* as *it* donot take the *āgama i* (=Pāṇinian *iḍāgama)* in forming their non-causal past passive participles (=Pāṇinian *niṣṭhā).* Thus the non-causal past passive participles of √*mid* which is *ādit* are *minna, minnavān.* In the absence of such a rule, the formations would have been *medita, meditavān.* The root *mid* is laid down by Pāṇini as *ñīmīdā.*

2.1.3. *i* as *it* :

The Pāṇinian rule *idito num dhātoḥ,* 7.1.58 states that the roots which have *i* as the *it*-sound take the *āgama num* i.e. *n* while conjugating. Thus we have the form *skundate* from √ *skudi* with *i* as *it.* As the *āgama* is *mit,* it is applied after the last vowel. In √*skud,* the last vowel is *u;* the *n*

6. For a critical study of the Pāṇinian *dhātupāṭha, cf. G. B. PALSULE, ibid.*

is applied after *u* and the root assumes the form *skund.*

2.1.4. *ī* as *it :*

The Pāṇinian *sūtra, śvīdito niṣṭhāyām,* 7.2.14 prohibits the *iḍāgama* for roots which have long *ī* as *it.* Thus, the root *und,* which in Pāṇinian *dhātupāṭha* is read as *undī,* with long *ī* as *it,* gives out the past pass. participial form as *unna/utta* and not *undita* with *iḍāgama.*

2.1.5. *u* as *it :*

The Pāṇinian *sūtra, udito vā,* 7.2.56 states that the roots which are read in the *dhātupāṭha* with short *u* as *it* get optionally the *idāgama* in forming their gerundive forms with *tvā*-suffix. The root *śam,* laid down in the *dhātupāṭha* as *śamu* with *u* as *it,* forms its *kṛt*-formation in *tvā* opitionally with and without *iḍāgama,* as *śamitvā* (with *iḍāgama)* and *śāntvā* (without *iḍāgama)*

2.1.6. *ū* as *it :*

The roots with long *ū* as *it* also get the *iḍāgama* optionally before the *ārdhadhātuka* suffixes with sounds in the *pratyāhāra val* in the beginning. Thus we have the root *ṣidhū* (i.e. *sidh)* with *ū* as *it.* The form in 1st future, 3rd pers. sing. will be without *iḍāgama*, as *seddhā,* and with *iḍāgama* as *sedhitā.* The Pāṇinian *sūtra* is : *svaratisūtisūyatiudhūñūdito vā,* 7.2.44.

2.1.7. *ṛ* as *it :*

The penultimate vowel *(upadhā)* of the roots with *ṛ* as *it* is not shortened in their causal aorist forms. The Pāṇinian *sūtra* is : *nāglopiśāv ṛditām,* 7.4.2. Take, for example, the root *gādh,* Pāṇinian *gādhṛ.* The causal aorist, 3rd pers. sing. form is *ajagādhat,* the penultimate vowel *ā* of *gādh* not

being shortened. In the absence of the *sūtra,* 7.4.2, the form would have been *ajāgadhat* (the shortening of *ā* of *gādh* would take place according to 7.4.2 and the lengthening of *a* of *ja* would be according to 7.4.94.)

2.1.8. *ṝ* as *it :*

There is no root with long *ṛ* as *it.*

2.1.9. *ḷ* as *it :*

The roots with the vocalic sound *ḷ* as *it* take the *āgama aṅ* i.e. *a* in their aor. formations in *parasmaipada.* The *sūtra* which lays down this rule is : *puṣādidyutādy ḷditaḥ parasmaipadeṣu,* 3.1.55. Thus the *parasmaipada,* aor. 3rd pers. sing. form of the root *gam* (which Pāṇinian *dhātupāṭha* reads as *gamḷ* with *ḷ* as *it)* is *agamat* and not *agāmīt.*

2.1.10. *e* as *it :*

The vowel of the roots with *e* as *it* does not get the *vṛddhi* grade before the *āgama sic* applied to the aor. terminations with *ī* in the *parasmaipada.* The *sūtra* is : *mhyantakṣaṇaśvasajāgṛṇiśvyeditām,* 7.2.5. The *vṛddhi* is enjoined by the *sūtra, ato halāder laghoḥ,* 7.2.7. Thus, the normal aor. 3rd pers. sing. of the *edit* root *kaṭ* (Pāṇinian *kaṭe)* would be *akāṭīt.* But because of the *sūtra,* 7.2.5 which prohibits the *vṛddhi,* the form is *akaṭīt.*

2.1.11. *o* as *it :*

In the case of roots with *o* as *it,* the *t* of the participial suffixes *ta* and *tavat* (Pāṇinian *kta* and *ktavat)* is substituted by *n* according to the *sūtra, oditaśca,* 8.2.45. Thus, the participial formations of the *odit* root *vij* (Pāṇinian *ovijī)* are *vigna* and *vignavat* and not *vikta* and *viktavat.*

2.1.12. *k* as *it :*

There are only two roots in the whole of the Pāṇinian *dhātupāṭha* which have the consonantal sound *k* as *it* and they are √*hā*, 3rd conj. *parasmaipada*, read in the *dhātupāṭha* as *ohāk* and √ *i*, 2nd conj. parasmaipada, read by Pāṇini as *ik*. The *it*-sound *k* has the simple function of distinguishing these two *kit* roots from their corresponding homophones viz. *hā* and *i* which are read by Pāṇini as *ohāṅ* (with *ṅ* as *it)* and *iṇ* and *iṅ* (with *ṇ* and *ṅ* as *it*) respectively. The *it*-sound *ṅ* indicates the *ātmanepada*, with the result that the present *kit* √*ohāk* i.e. *hā* is to be conjugated in *parasmaipada* and *ohāṅ* in the *ātmanepada*. In the case of the homophonous roots *i*, the *it*-sounds *k ṇ* and *ṅ* indicate the difference in meaning. While *ik* means 'to remember' *(cf.* Pāṇinian *dhātupāṭha, ik smaraṇe)*, the root *iṇ* signifies 'to go' *(cf. iṇ gatau)* and the root *iṅ* means 'to study' *(cf. iṅ adhyayane)* and is conjugated in Ātmanepada.

2.1.13. *ṅ* as *it* :

Roots with *ṅ* as *it* are to be conjugated in *ātmanepada* according to the Pāṇinian *sūtra, anudāttaṅita ātmanepadam*, 1.3.12. The root *ohāṅ*, mentioned above, with *ṅ* as *it*, is therefore conjugated in *ātmanepada* as *jihīte*, while *ohāk* not with *ṅ* as *it*, is conjugated in *parasmaipada* as *jahāti*.

2.1.14. *ñ* as *it* :

The *ñit* character of the root suggests that they are to be conjugated in both the *padas*, viz. *ātmanepada* and *parasmaipada*. The *sūtra* is : *svaritañitaḥ kartrabhiprāye kriyāphale*, 1.3.72. Thus, the *ñit* root *dhā* (Pāṇinian *ḍudhāñ)* is conjugated in both the *padas*, as *dadhāti (parasmaipada)* and *dhatte (ātmanepada)*.

2.1.15. *ṭ* as *it* :

There is only one root which has *ṭ* as *it* and it is √*dhe,* Pāṇinian *dheṭ.* All the commentators on Pāṇini and his *dhātupāṭha* interpret the *ṭit* character of the root to mean that the feminine formation of the verbal derivative *dhaya* from the root *dheṭ* is in *ī* (Pāṇinian *ṅīp*) as *dhayī* in *stanaṁdhayī* according to the *sūtra* 4.1.15. Though the *sūtra* 4.1.15 is applicable to formations with *ṭit suffixes, it is not applicable to the ṭit dhātus.* The *ṭit* character, therefore, seems to be meaningless especially in view of the fact that there is no other homophonous root like *dhe.*

2.1.16. *ṇ* as *it :*

There are only two roots which are *ṇit,* they are :

(i) *dā,* Pāṇinian *dāṇ,* 1st conj. *parasmaipada,* and (ii) *i,* Pāṇinian *iṇ,* 2nd conj. *parasmaipada.*

2.1.16.1 The *ṇit* character of the root *dā* distinguishes it from other homophonous and semantically identical roots, viz. *dāp,* i.e. *dā,* a *pit,* 2nd conj. and *ḍudāñ,* i.e. *dā,* 3rd conj. *ubhayapada.* Secondly, the *ṇit dā* is substituted by *yacch* in all its *sārvadhātuka* forms according to the *sūtra,* 7.3.78, while the other non-*ṇit* roots are not.

2.1.16.2. The *ṇit*-character of the root *i* i.e. *iṇ,* as we have seen, before, distinguishes it from its other homophones *ik* and *iṅ,* in meaning as well as conjugation.

2. 1. 17. *p* as *it*

There are only two roots with *p* as *it;* they are :

(i) *daip* i.e. *dai,* 1st conj. *parasmaipada,* and (ii) *dāp,* i.e. *dā,* 2nd conj. *parasmaipada.* The *pit*-character distinguishes these two roots from their homophonous equivalents viz. *dāṇ* i.e. *dā* > *yacch* (noted above) and

ḍudāñ i.e. *dā,* 3rd conj. *ubhayapada.*

Besides this function, the *pit*-character affects indirectly the grammatical side also. The Pāṇinian *sūtra, dādhāghv adāp,* 1.1.20, terms as *ghu* all the roots which assume the form *dā* and *dhā* before conjugational *vikaraṇas* and teminations. The roots which change to *dā/dhā* are called *dārūpa* and *dhārūpa* respectively. The *sūtra* 1.1.20 excludes the *pit* roots *dāp* and *daip* from being termed as *ghu.* There are only four *dārūpa* roots, viz. *ḍudāñ, dāṇ, do* and *deṅ,* which only can be termed as *ghu.* The result is that while the final *ā* of the *ghu* i.e. *dā-rūpa dhātus* changes to *e* before the *kit* terminations of the pot. *(vidhiliṅ)* and benedictive *(āśīrliṅ)* according to the *sūtra, er liṅi,* 6.4.67, the final *ā* of the non-*ghu* i.e. non-*dārūpa dhātus* does not. Thus the *liṅ*-forms of the *dārūpa* i.e. *ghu dhātus* will be *deyāt* while those of the non-*dārūpa*, non-*ghu dhātus* will be *dāyāt.*

2.1.18. *ṣ* as *it* :

The roots with *ṣ* as *it* take the *āgama a* i.e. Pāṇinian *aṅ,* before the application of feminine suffixes. The *sūtra* is *ṣidgauradibhyo'ṅ,* 3.3.104. The result is that the root-noun thus formed from the *ṣit*-roots always gets the ending *a;* and then the feminine suffix *ā* is applied by the *sūtra, ajādyataṣ ṭāp.* 4.1.4.

The following example of the *ṣit* root *jṝ* i.e. Pāṇinian *jṝ̄ṣ* will illustrate the point. The root noun from *jṝ* is *jar.* Then,

jar+a (Pāṇinian aṅ)

= *jara.* Then with the fem. suffix *ā,* we have, *(jara+ā =) jarā.* In the absence of the *āgama a,* the fem. formation

would have been either *jar* or *jarī*.

3. The double-sound *it*-sounds

Besides the single-sound *it*-sounds, Pāṇini has also used some double-sound *it*-sounds in the case of roots. They are in all four : (i) *ñi, ṭu, ḍu* and *ir*.

3.1. *ñi* as *it* :

The roots with *ñi* as the *it*-symbol get the past passive participial suffix *-ta* (Pāṇinian *kta* called as *niṣṭhā)* in the sense of the present tense and not past. The Pāṇinian *sūtra* is : *ñītaḥ ktaḥ,* 3.2.187. Thus the *kṛt*-formation in *-ta* i.e. *niṣṭhā* of the root *mid* which is a *ñit* (Pāṇinian *ñimidā)* is *minna* and means not 'one who *was* affectionately inclined', but 'one who *is* affectionately inclined'.

3.2. *ṭu* as *it* :

The function ascribed to the sound-group *ṭu* is that the *ṭu-it* roots take the suffix *athu* (Pāṇinian *athuc)* in forming their *kṛt*-formations in a *bhāve* sense. The *sūtra* is *ṭvito'thuc,* 3.3.89. Thus,

√*vep* (Pāṇinian *ṭuvepṛ)* + *athuc*

= *vep+athu*

= *vepathu* 'trembling'

3.3. *ḍu* as *it* :

The *ḍu-it* roots take the suffix *tri* (Pāṇinian *ktri)* in forming their *kṛt*-formations in a *bhāve* sense. The *sūtra* is *ḍvitaḥ ktriḥ,* 3.3.88. The peculiarity of this suffix is that it always takes the *āgama ma* (Pāṇinian *mam)* according to the *sūtra, ktrer mam nityam,* 4.4.20. Thus, the *kṛt*-formation in a *bhāve* sense of the root *kṛ* (Pāṇinian

ḍukṛñ) is : *kṛ+tri+ma = kṛtrima* 'unnatural action', i.e. 'artificial'.

3.4. *ir* as *it* :

Pāṇini nowehre defines *ir* as *it,* though tradition accepts the whole sound-group *ir* as *it* on the basis of the Pāṇinian *sūtra, irito vā,* 3.1.57.,

The peculiarity of the *irit* roots is that they optionally take the *āgama a,* Pāṇinian *aṅ,* in their *parasmaipada,* aor. forms. The *sūtra* is 3.1.57 quoted above. Thus there will be two forms in aor. of the *irit* roots - one with *a* i.e. *aṅ* and the other without *a.*

Take, for example, the *irit* root *ścyut* (Pāṇinian *ścyutir);* with *aṅ,* the process is :

a+ścyut+t

= a+ścyut+a (i.e. *aṅ) +t*

= aścyutat, the *ṅit* character of the *āgama aṅ* prohibiting *guṇa* or *vṛddhi; cf.* 1.1.5 above.

Without *aṅ,* the process is :

a+ścyut+t

= a+ścyut+ī+t (long *ī* i.e. *īṭ* added by 7.3.96)

= a+ścyot+ī+t (guṇa according to 7.3.86)

= aścyotīt.

4. Accent of the *dhātus :*

As we all know, the text of *Aṣṭādhyāyī* was an accented one, as is clear from the references in the Pāṇinian *sūtras* themselves to accent. For example, the topic of *adhikāra* starts with a *sūtra* with *svarita* accent, *cf.* the Pāṇinian

sūtra, svaritenādhikāraḥ, 1.3.11. That Pāṇini knows and treats the accent is also clear from his treatment of the Vedic accent. In his grammar, even the suffixes have accent, *cf.* the *sūtra, luṅlaṅlṛṅkṣv ad udāttaḥ,* 6.4.71 which specificially mentions the *āgama aṭ* i.e. *a* as *udātta.* It is no wonder, therefore, that the *dhātus* enumerated in his *dhātupāṭha* also have an accent in the original *upadeśa.* And one will be extremely surprised to know that Pāṇini has used this accent on the vowels of the *dhātus* for bringing about some grammatical function.

In all there are three main accents in Sanskrit, and hence in Pāṇini's grammar : *udātta* (defined in *uccair udāttaḥ,* 1.2.29), *anudātta* (defined in *nīcair anudāttaḥ,* 1.2.30) and *svarita* (defined in *samāhāraḥ svaritaḥ,* 1.2.31). The vowels in the roots get one of these three accents at the time of the *upadeśa.* This means that the accent may fall either on the vowels in the roots which are not *it* or on those which are *it.* And accordingly we get broadly three divisions of all the *dhātus* (i) those which have *udātta* on the *it*-vowels, these are called *udātta-it* (i.e. *udāttet) dhātus;* (ii) those which have anudatta accent on the *it*-vowels; they are called *anudātta-it* (i.e. *anudāttet) dhātus,* and lastly (iii) those which have *svarita* accent on the *it*-vowels; they are called as *svarita-it* (i.e. *svaritet) dhātus.* And marvously enough, Pāṇini has used this accentual character of the *it*-sounds also to indicate the *pada* of the *dhātus.* The illustrations will clear this point.

Accent is a supra-segmental category; and the *it*-technique is a purely artificial technique. The wonder of the Pāṇinian technical skill is that he has combined the supra-segmental category of accent with the *it*-technique

with powers of distinguishing the *padas* of the *dhātus* at the very stage of *upadeśa* itself (i.e. first or original Pāṇinian pronunciation or statement). We will thus find that Pāṇini has left no stone unturned and has used every possible means at his hand in describing the Sanskrit language to as comprehensive an extent as possible.

As we know that there are two *padas* in Sanskrit - the *parasmaipada* and the *ātmanepada*. Besides there are some roots which are conjugated in both the *padas*. Since *pada* also forms an important category of the Sanskrit roots, it is interesting to see how Pāṇini has used the *it*-accent for indicating the *padas* of the Sanskrit *dhātus*.

4.1. roots with *udātta*-vowel as *it* :

There is no specific *sūtra* which states a particular function of the *pada* for the *udāttet* roots. After defining the function of the *anudāttet* and *svaritet* roots, Pāṇini frames the *sūtra, śeṣāt kartari parasmaipadam,* 1.3.78. BD's commentary on this *sūtra* is very clear : *ātmanepada-nimittahīnād dhātoḥ kartari parasmaipadaṁ syāt.* Kāśikā is still more clear : *pūrveṇa padenātmanepadaniyamaḥ kṛtaḥ, na parasmaipadaniyamaḥ... yebho dhātubhyo yena viśeṣaṇenātmanepadam uktam tato yad anyat sa śeṣaḥ. śeṣāt kartari parasmaipadaṁ bhavati. śeṣād eva nānyasmāt.* All this means that so far as the accent on the *it*-vowels is concerned, except the *dhātus* with *anudātta* and *svarita* vowels as *it,* all other *dhātus*[1] are the *udāttet dhātus.* It is also to be noted that Pāṇini states that the basic conjugational ten *lakāras* are to be used in the *parasmaipada* primarily; *cf.* the *sūtra, laḥ parasmaipadam,* 3.4.99; *cf.* BD : *lādeśāḥ parasmaipadasaṁjñāḥ syuḥ.* This means that Pāṇini starts the definition of *pada* with

parasmaipada as basic in which category the *udāttet* roots are to be included later on. The *dhātupāthakārikās* listing all the roots in the form of verses frequently refer to *udāttet* roots as belonging to *parasmaipada; cf. phakkādaya udāttetaḥ parasmaipadasaṁjñakāḥ,* I.37 etc.

Thus roots with *udātta* accent on the *it*-vowel get the terminations of the *parasmaipada.*

4.2. roots with *anudātta* - vowel as *it :*

The roots which have *anudātta* accent on the *it*-vowels are to be conjugated in the *atmanepada.* The Pāṇinion *sūtra* is : *anudāttaṅita ātmanepadam,* 1.3.12; cf. also *dhātupāṭhakārikā : varcādayo' nudāttetaḥ ātmanepada-gāminaḥ,* I.42

4.3. roots with *svarita*-vowel as it :

The roots which have *svarita*-accent on its *it*-vowel are to be conjugated in the *ātmanepada; cf.* the *sūtra, svaritañitaḥ kartrabhiprāye kriyāphale,* 1.3.72. The basic semantic condition for the *svaritet* roots to be conjugated in the *ātmanepada* is *kartrabhiprāya kriyāphala,* that is to say, if the result of the action of the verb affects the actual agent of the action. If it does not affect the agent, the root will take the *parasmaipada* terminations only. In effect this means that the *svaritet* roots will get both the *padas,* viz. *ātmanepada* as well as *parasmaipada; cf. dhātupāṭhakārikā : svaritetāv ubhayatobhāṣau dhātū manīṣibhiḥ,* I.227.

Thus, with the help of the accent of the *it*-sounds - and the accent is always on the vowels in Sanskrit - Pāṇini described the *padas.* Pāṇini in this way employs the accent of the *it*-symbols in his grammar.

One must, however, remember that the above rules of the accent of the *it*-vowels in the roots are not very hard and fast ones. As we all know, language always evades all our attempts for comprehensive and hard-and-fast descriptions. And we will find the *udāttet* roots conjugated in *ātmanepada* and the *anudāttet* in the *parasmaipada* in later Sanskrit. But at least it is true that the state of affairs which Pāṇini describes in his grammar must have prevailed in the actual usage in the language in his times.

5. *It*-zero in the *prātipādika* :

There is only one single, solitary example of a *prātipādika* getting an *it*-sound attached to it, and it is of the word *amāvāsya*. The word is explained both formally and accentually by Pāṇini in the *sūtra, amāvāsyad anyatarasyām,* 3.1.122. The *sūtra* explains the word *amāvāsya* by *nipātana*. But the thing to be noted is that the *nipātita* word *amāvāsya* is accompanied by the *it*-sound *t; cf.* the *t* in the final positions of the word *amāvāsyat*. The function of *t* is to bring about the accentual variation in the words *amāvasyā/amāvāsyā*. The accent is a *svarita* on the final vowel *ā,* as *amāvasyā́,* according to the *sūtra*, *tit svaritam,* 6.1.185.[7]

6. *It*-zero in the *nipāta* :

The *nipātas* donot provide even a single example of an *it*-sound attached to any of them.

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7. For a detailed study of the word *amāvasyā* and its accent based on its *tit*-character, *cf. M. D. BALASUBRAHMANYAM,* 'Amāvasyā : An Accentual Study,' JUP, (Humanities), 1967.

APPENDIX 3

It-sounds suggested by *Vārttikakāra Kātyāyana.*

1. We have seen before that what was a simple device of the *it*-sounds employed by the author of the *śiva-sūtras*, whose aim was only to form the *pratyāhāras* of sounds and to indicate their final limit was developed and turned into a highly complicated and intelligent technique by Pāṇini in his grammar. What is still more interesting to see is that the *vārttikakāra Kātyāyana,* whose *vārttikas* aim at improving on Pāṇini and form a base for Patañjali to write his *Mahābhāṣya* also uses this technique; he goes still a step further and tries to improve on Pāṇini by suggesting some *it*-sounds to embrace even the field of semantics also.

The whole discussion starts on the Pāṇinian *sūtra, svam rūpam śabdasyāśabdasaṁjñā,* 1.1.68, which stresses emphatically the formal aspect of a word, devoid of its semantic content and excludes the technical terms like *ghi, ghu, ṭi* etc. from its sphere. In spite of this attempt by Pāṇini to exclude meaning, there are certain *sūtras* in his grammar where the present *sūtra* fails to define the formal and semantic spheres correctly. At this stage Kātyāyana comes forward and tries to improve on Pāṇini by suggesting the employment of certain *it*-sounds which would dispel the confusion and inaccuracy. The following are the examples in which Kātyāyana suggests the employment of the *it*-sounds *s, p, j* and *jh* to specify clearly the different semantic spheres of semantic equivalents, the particular species as against the *summum genus* and the form and meaning of the words themselves used in the *sūtras*.

1.1. Example of *s* as *it* :

The *sūtra* in question is 2.4.12 *(vibhāṣa vṛkṣamṛga* etc.) The *sūtra* aims at describing the compound of two or more types of trees into a *samāhāra dvandva;* thus the *dvandva samāsa* of the two types of trees *plakṣa* and *nyagrodha* will be a *samāhāra dvandva* like *plakṣanyagrodham* with singular number and neuter gender. But the wording of the above *sūtra* has no definite marker to indicate that the word *vṛkṣa* etc. in the *sūtra*, which is the common name for "all trees", should mean here not "the tree or trees" in general but "the particular or the types of trees". Secondly on the basis of the *sūtra*, 1.1.68, the word *vṛkṣa* will stand for itself i.e. its own form composed of *v, ṛ, k, s* and *a* and will not mean either even 'a tree' or 'the different types of trees' like *plakṣa, nyagrodha* etc. This formal meaning is, however, not at all intended here. And we have to depend on the traditional commentary for its interpretation and for the usage of compounds like *plakṣanyagrodham.* Strictly from logical point of view, this is a draw-back in Pāṇini's grammar in so far as it is not logically self-sufficient to offer an interpretation of the *sūtras* of the above type within its own technical structural frame.

At this stage the vārttikākāra comes forward and tries to fill up this gap by supplying the *varttika, sidviśeṣāṇām vṛkṣādyartham* on the Pāṇinian *sūtra*, 1.1.68. What the *vārttika* means is that the words like *vṛkṣa* etc. should be accompanied by the *it*-sound s so that they will be able to refer to the particular types within their species. Thus the words *vṛkṣa, mṛga* etc. given in the *sūtra*, 2.4.12, should have been read as *vrkṣas, mṛgas* etc. with *s* as *it.* This indicatory sound *s* would then be empowered with the capacity to denote 'the individuals' of the species *(viśeṣa)*

as opposed to 'the general' *(sāmānya)* as well as 'the form' *(svam rūpam) of the words; cf.* Patañjali on the *Vārttika : sinnirdeśaḥ kartavyaḥ ... kim prayojanam? vṛkṣādyartham tato vaktavyam tadviśeṣānām grahaṇam bhavatīti.* Patañjali who always has a tendency to oppose the vārttikakāra does not pass any remark either for or against this suggestion.

Thus by Kātyāyana's technique, the word *vṛkṣa* will indicate not the form but its meaning as general species of 'tree' as well as 'the individuals' in the species. The problem of logical insufficiency will automatically thus vanish. The *s* thus totally excludes the forms *vṛkṣa, mṛga* etc. as required by Pāṇini by the *sūtra*, 1.1.68 and includes only its general and particular meaning and species.

1.2. Example of *p* as *it :*

The form in question is *svapoṣam* which is a compound of *sva* and *poṣa,* a *kṛt*-derivative from √ *puṣ* with the suffix *-am* i.e. Pāṇinian *ṇamul* according to the *sūtra, sve puṣaḥ* 3.4.40. Now, according to the *sūtra*, 1.1.68, the word *sva* will indicate only its form composed of the sounds *s, v* and *a* and not its meaning, nor again its synonyms nor the individuals in its species. The compound according to this *sūtra* will take place only between the two members *sva* and *puṣ.* Yet we find compounds like *dhanapoṣam, raipoṣam* in which the first members *dhana, rai* are the synonyms of *sva* (='wealth'); we also find compounds like *gopoṣam, aśvapoṣam* in which the first members *go, aśva* are the individual members of the general species of *sva* i.e. wealth. The problem, therefore, is : if the word *sva* in the *sūtra* indicates according to the definition only the form of the word, where all those meanings of synonyms and individual members of the species come from ? These

meanings and usages are available only from the linguistic usage and the interpretation of the Pāṇinian *sūtra,* given in the traditional commentaries. In other words, that Pāṇinion rule 1.1.68 could not cover up such cases itself means that either his grammer is not fully comprehensive or is faulty or defective from logical point of view.

The *varttikakāra* tries to help Pāṇini by improving on him and supplies a new *vārttika* viz. *pit paryāyavacanasya svādyartham* on the *sūtra*, 1.1.68. What the *vārttika* means is that Pāṇini should have applied the *it*-sound *p* to the word *sva* in the *sūtra*, 3.4.40, with *p* invested with the power of indicating 'the form (*svam rūpam)* as well as its meaning and synonyms *(paryāya)* and the individual member of the species of 'wealth' like *go, aśva* etc. *(viśeṣa)'.* Only with this technique other forms like *gopoṣa, dhanapoṣa* etc. are accountable; *cf.* Patañjali on the *vārttika: pinnirdeśaḥ kartavyaḥ. tato vaktavyam paryāyavacanasya tadviṣeṣāṇām ca grahaṇam bhavati. kim prayojanam ? svādyartham.*

Thus by *Kātyāyana's* technique, the word *sva* will be turned into *svap* with *p* as *it,* the *sūtra* will read as *svapi puṣaḥ* and the renewed word *svap* i.e. the *it*-sound will indicate its form, its meaning and synonyms and the individual members of its species. Patañjali has no comment to offer in this case also.

1.3. Example of *j* as *it :*

The compounds in question are *rāja-sabhā* as opposed to *inasabham, īśvarasabham* etc. and these compounds are described by Pāṇini in the *sūtra, śabhā rājāmanuṣyapūrvā,* 2.4.23. What the *sūtra* means is that the compound of the word *sabhā* as its posterior i.e. second member, with the

first member as a synonym of the word *rājā* (='a king') is used in neuter if the synonym of the first member word *rājā* refers to the king of non-human beings. Thus if the words *rājan* and *sabhā* are compounded (if *rājan* or its synonym refers to a human king), the compound will be *rāja-sabhā;* or even *nṛpa-sabhā, nṛpati-sabhā, bhūpati-sabhā* etc. But if the synonym of *rājan* as the first member of the compound with *sabhā* refers to a non-human being, the compound will be in neuter, as in the case of *ina-sabham.* (in which the word *ina* means 'the king of elephants') or *īśvara-sabham* (in which the word *īśvara* meaning 'the lord, the king' refers to God) etc. *cf.* BD on the *sūtra, rājaparyāya-pūrvo'manuṣyapūrvas'ca samāsāntas tatpuruṣo napuṁsakam syāt.* In interpreting the words *sabhā* and *rājā* in the *sūtra*, the word *rājā* crosses the boundaries of 'form' as laid down by the Pāṇinian *sūtra*, 1.1.68 and embraces the meaning of *rājā* and its synonyms. Such an interpretation is not warranted by the Pāṇinian *sūtra*, 1.1.68 and Pāṇini's grammar seems to fall far short of the requirements of language and its speakers. And this so to say indicates a certain deficiency in the grammatical system of Pāṇini because we have to take recourse to the traditional commentaries and the linguistic usage to explain the compounds like those mentioned above.

The *vārttikakāra* comes forward at this state to provide for the Pāṇinian deficiency and frames the rule, *jit paryāyavacanasyaiva rājādyartham.* What it means is that in cases like *rājā* etc. noted in the *sūtra*, 2.4.23, an *it*-sound like *j* should be attached to the word concerned, so that the word will indicate only its semantic equivalents and not its form or its species and individuals. The *it*-sound *j* is

naturally to be invested with such power. Such a device will make the grammar self-sufficient and fully comprehensive. Thus instead of the word *rājā*, the word *rājāj* or *rājan-j* or some such word should be laid down with *j* as *it*, which will indicate the desired meaning of 'synonyms referring to non-human beings'. *cf.* Patañjali on the *vārttika : jinnirdeśaḥ kartavyaḥ. tato vaktavyam paryāyavacanasyaiva grahaṇam bhaviṣyati. kim prayojanam ? rājādyartham.* Patañjali does not pass any remark, either for or against.

1.4. Example of *jh* as *it* :

The forms in question are the *taddhita* derivatives like *pākṣika (=pakṣin+ika* i.e. *ṭhak), mātsyika (=matsya+ika* i.e. *ṭhak)* and *mārgika (=mṛga+ika* i.e. *ṭhak),* (all the three with the *taddhita* suffix *ṭhak > ika*) according to the Pāṇinian *sūtra, pakṣimatsyamṛgān hanti,* 4.4.35. The suffixes are applied in the sense of 'killing'; thus *pākṣika* = 'one who kills the *pakṣin* i.e. birds'; *mātsyika* = 'one who kills the *matsya* i.e. fish'; and *mārgika* = 'one who kills the *mṛga* i.e. deer or beasts in general'. Besides these three forms, which are stated to have been formed only from the three given *prātipadikas,* viz. *pakṣin, matsya* and *mṛga,* we get other forms like *śākunika* (from *śakuna* which is the name of a bird), *mainika* (from *mīna* which is a synonym of *matsya)* and *sāraṅgika* (from *sāraṅga* which is a kind of deer or beast) etc. Now, obviously, strictly according to the Pāṇinian definition of the scope of grammar given in the *sūtra*, 1.1.68, only the three words mentioned in the *sūtra*, 4.4.35 viz. *pakṣin, mṛga* and *matsya* are entitled to get the suffix *ṭhak > ika;* and its synonyms and the individual members are totally excluded. But since we get the *taddhita* formations from their synonyms also, it speaks for a

deficiency in Pāṇini's description.

At this stage, Kātyāyana suggests the device of applying a suitable *it*-sound to these *prātipadikas* which can be empowered to include or exhaust all the possibilities in which the *taddhita* formations of the above type can be explained and derived. The *it*-sound he suggests is *jh; cf.* his *vārttika : jhiṭ tasya ca tadviśeṣāṇām ca matsyādyartham.* The *jh* applied as *it* to the three prātipadikas will be the indicatory symbol to include all such formations. Thus the word *pakṣin/pakṣi* with *jh* should be enunciated as *pakṣin-jh/pakṣi-jh; matsya* with *jh* as *matsya-jh* and *mṛga* with *jh* as *mṛga-jh; cf.* Patañjali on the *varttika : jhinnirdeśaḥ kartavyah. tato vaktavyam tasya ca grahaṇam bhavati tadviśeṣāṇām ceti. kim prayojanam ? matsyādyartham.*

What Kātyāyana empowers the *it jh* with is only the form of the words stated in the *sūtra* and the individual members of the species and not their synonyms. BD on the other hand includes their synonyms also; *cf.* BD on the *sūtra*, 4.4.35 : *svarūpasya paryāyāṇām viśeṣāṇām ca grahaṇam,* so also Kāśikā : *svarūpasya paryāyāṇām ca tadviśeṣāṇām ca grahaṇam iheṣyate.*

Patañjali does not pass any comment on this.

2. The *it*-sounds of Pāṇini and Kātyāyana - A Comparison :

2.1. We have here four *it*-symbols introduced by the *vārttikakāra* Kātyāyana. They are *s, p, j* and *jh.* Pāṇini, as we have noted earlier, has already used these very four sounds as symbols in his grammar. Out of these four, the sounds *s* and *p* have specific function to perform in his

grammar while the *it*-sounds *j* (as in *jas* of the nom. plu.) and *jh* (as in *jhi,* pres. 3rd pers. plu.) are not invested with any function. Why Kātyāyana suggested these four sounds as *it* which are already employed by Pāṇini is not clear. He could have suggested other sounds like *ph, bh, y, h* etc. which are not employed either by the author of the *śiva-sūtras* or by Pāṇini. The functions of *s* and *p* in Kātyāyanas *vārttikas* are different from those in Pāṇini's *sūtra (cf.* before) and are likely to create confusion.

2.2. There is yet another characteristic difference between the *it*-sounds introduced by Kātyāyana and Pāṇini. Pāṇini has infused the *it*-sounds with the power of bringing about certain changes in the grammatical process to arrive at the usable form; so does Kātyāyana also, no doubt. Yet though the purpose or aim of the introduction of the *it*-technique is the same for both of them, the functions which Pāṇini invests the *it*-sounds with are purely on the level of grammatical process; no semantic considerations are brought in or involved in his technique. He in a way very carefully tries to keep away from the semantic aspect of the forms. Kātyāyana's *it*-sounds, on the other hand, actually work in the field of semantics itself, only to include those cases which are formally left out but are semantically accountable. The semantic functions that Kātyāyana infuses into the four *it*-sounds with are manyfold, as can be seen from the *vārttikas.* It is mainly four-fold : (1) the direct or primary meaning *(abhidhā)* of the word; (2) the semantic equivalents or synonums of the word *(paryāyavacana)* and (3) the meaning of words as indicating a group *(sāmānya)* and (4) as indicating the individual members of the group *(viśeṣa).* Besides this, the form itself as pure form is also

taken as one of the menaings of the words, as Pāṇini enunciates in the *sūtra*, 1.1.68 *(svam rūpam),* though in some cases (as in the case of *vṛkṣas* etc. in the *sūtra*, 2.4.12) both the form and primary meaning of the words are excluded from the province of the *it*-sounds by Kātyāyana. But these are not watertight compartments. The *it*-sounds are invested with the power of signifying either one or two or all the three meanings simultaneously. Thus, the *it*-sound *s* indicates only the meaning of *viśeṣa;* the *it*-sound *j* also refers to only one meaning of *paryāya;* the *it*-sound *jh,* on the other hand, signifies, according to Kātyāyana, the form of the word in the *sūtra*, as well as the individual members of the whole group signified by the meaning of the word; the *it*-sound *p* signifies the form and meaning of the words, the individual members of the group formed on the basis of meaning as well as the synonyms of the word. This is in line with the Pāṇinian *it*-technique which also infuses the *it*-sounds with either only one or many functions. The *it*-sound *s* in Pāṇini's grammar has only one function to perform, viz. *vṛddhi* while the *it*-sound *p* has many functions to perform. It is also to be noted in this connection that Patañjali, who becomes a harsh critic of Kātyāyana in Pāṇini's favour, when he disagrees with or disapproves any suggestion by the latter, is all silent in the case of all the above four suggestions by Kātyāyana of employing the four *it*-sounds in the cases concerned. We donot know definitely whether Patañjali justifies Kātyāyana or not. His silence can be taken both ways, suitably in Pāṇini's or Kātyāyana's favour. But that Patañjali displays not a single argument in opposition can very conveniently be taken to mean that he cannot refute Kātyāyana's suggestions, though he may not like the deficiency in

Pāṇini's grammar pointed out by the latter.

The peculiarity of the *it*-technique of Kātyāyana is that he specifies purely semantic functions for the *it*-sounds in total contrast with that of Pāṇini who has restricted himself to the formal sphere only in assigning to the *it*-sounds the functions of grammatical operations. No *it*-sound is given a semantic function in Pāṇini's grammar.

● ●

Appendix 4

Statistical Picture of the five Categories of *vyavasitas* to which *it*-sounds are attached.

As we have already said, Pāṇini employs the *it*-sounds to the five categories of *vyavasitas*, viz *dhātu, pratyaya, āgama, ādeśa* and *prātipadika*. The present Appendix 4 gives a statistical picture of the different *vyavasitas* to which the different *it*-sounds are attached.

4.1. The *dhātus* :-

As is well - known, the Sanskrit dhātus take different *vikararaṇas* in their conjugation, and accordingly Pāṇini has divided all the *dhātus* into ten conjugations in his *dhātupāṭha*. The Pāṇinian *dhātupāṭha* serves as the basis for the present statistical picture. Besides the Pāṇinian *dhātupāṭha*, the *Sanskrit Dhātu Koṣa*[1] prepared by YUDHIṢṬHIRA MĪMĀṂSAKA is also utilised since it is also mainly based on Pāṇinian dhātupāṭha. According to Pāṇinian *dhātupāṭha*, the total number of *dhātus is 1960.*

4.1.1. Total number of roots or dhātus :-

The *gaṇa* - wise numerical distribution of the *dhātus* is as follows :-

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1. cf. YUDHIṢṬHIRA MĪMĀṂSAKA, *Sanskrit Dhātu Koṣa* (in Hindi), Shri Pyārelāl Drākṣādevī Nyāsa, New Delhi, Saṁvat 2028 (circa, 1971).

1st	conjugation	or *bhvādi*-class	:	1059
2nd	"	or *adādi*-class	:	72
3rd	"	or *juhotyādi*-class	:	25
4th	"	or *divādi*-class	:	137
5th	"	or *svādi*-class	:	34
6th	"	or *tudādi*-class	:	143
7th	"	or *rudhādi*-class	:	25
8th	"	or *tanādi*-class	:	10
9th	"	or *kryādi*-class	:	61
10th	"	or *curādi*-class	:	394
		Total No. of roots	:	1960[2]

Out of this, 170 roots are repeated 370 times in the different classes; hence excluding these repetitions, we get (1960-370+170=) 1760 as the total number of verbal bases which are structurally different from one another.

Besides these verbal classes, there is yet another class of artificial or secondary roots called *kaṇḍvādi gaṇa* which consists of 60 roots. These roots are artificial or secondary in the sense that the verbal bases that are found out from their usable formations can also be used as *pratipadikas.*[3] The peculiarity of these roots is that they always take the infix - *ya* (Pāṇinian *yak*) in all their *lakāras,* both *sārvadhātuka* and *ārdhadhātuka.*

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2. cf. O. Böthlingk: ibid. pp. 61* - 94*.

3. cf. BD on 3.1.27 : *dvidhā hi kaṇḍvādayaḥ dhātavaḥ prātipadikāni ca* : cf. the same in the Kāśikā.

The *it*-sounds	No. of *dhātus*
A. Single-sound *it* sounds	
adit	1104
ādit	13
idit	273
īdit	58
udit	120
ūdit	23
ṛdit	170
ḷdit	13
edit	14
odit	18
k-it	2
ṅ-it	54
ñ-it	47
ṭ-it	1
ṇ-it	2
p-it	2
ṣ-it	7
Total	1921
B. Double-sound *it*-sounds	
ir-it	26
ñi-it	13
ṭu-it	12
ḍu-it	8
Total	59
C. Without *it*-sounds	129
Grand Total	2109

Table No. 1

Subtract from this number, the number of *dhātus* with two or three *it*-sounds at the time of *upadeśa*, like the root *ṭu-o-sphūrjā* (which has three *it* sounds, viz *ṭu, o* and *ā*) which are repeated in counting under different heads. The number of such repetitions is 149. Subtracting this, we get the total number of roots in the Pāṇinian *dhātupāṭha* as (2109 - 149 =) 1960, which is the figure noted above.

4.2. The *prātipadika* :

There is only one example of a *prātipadika* accompanied by an *it* - sound; the *it* - sound is *t* and the *prātipadika* is *amāvasyā*.

4.3 The *pratyayas, āgamas* and *ādeśas* :

The categories of the *pratyyas, āgamas* and *ādeśas* are put into one group for the sake of convenience. All these three *vyavasitas* make the total of 427. The peculiarity of the *it*-sounds of the category of *pratyayas* is that it exhibits the employment of four *it*- sounds at a time (*cf.* the examples of the *pratyayas kvanip,* which has the *k, v, i* and *p* as the four *it*- sounds, and *ṅvanip* which has the *ṅ, v, i* and *p* as the four *it*- sounds).

The following is the statistical picture of the above three categories with *it*-sounds[14] :-

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This statistics is prepared by Dr. Srimati SHAILAJA KATRE, Research Associate in the CASS.

No. of *it*-sounds	No. of the categories
1. Without *it*	110
2. Single *it*-sounds	175
3. Two *it*-sounds	125
4. Three *it*-sounds	10
5. Four *it*-sounds	7
Grand Total	427

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Bibliography.

ABHYAṄKAR K. V. — *Vedapāṭhacarcā* with *upalekhā sūtra,* BORI, Pune, 1974

ALLEN W. S. — 'Zero and Pāṇini', IL. Vol. 16, Poona, 1955

BASU S. C. — *Kāśikā,* vols. I & II.

— *Siddhānta Kaumudī,* Vols. I & II.

BARU RABINDRA NATH — A critical Study of the *Milindapañha,* Firma KLM Private Ltd, Calcutta, 1978

BALASUBRAHMAṆYAM M. D. — 'Amāvasyā — An Accentual Study,' JUP (Humanities), 1967.

BHAWE S. S. — 'Pāṇini and Lopa,' Cyclostyled copy ot the lecture to the Summer School of Linguistics Deccan College, Poona, 1960 (Translated into Gujrati by DR. A. N. JANI, *Mañjūṣā,* 1961).

— *Soma-hymns of the Ṛgveda,* Parts I, II and III, MSUB, Baroda, 1957, 1959, 1962.

BLOOMFIELD M. — *Rig-Veda Repetitions, HOS.* 20, 1916

— *A Vedic Concordance, HOS.* 10, 1906.

BLOOMFIELD L. — *Language,* London, 1961.

COHEN and EHRLITH — *Structure of Real Number-Systems.*

HAAS W. — 'Zero in Linguistic Description,' *SLA,* Special Volume of Philological Society, Oxford, 1957

HANS HADEMACHER and EMIL GROSSWALD — *Encyclopaedia of Science and Technology,* Vol. 14, 1977

HARDY and WRIGHT — *Number Theory,* Cambridge University Press, Cambridge.

JHA V. N. — 'Śaṅkjara vis-a-vis *śūnyavāda,'* Datta Maharaj Kavīśvara Felicitation Volume, 1990, Pune.

JOG K. P. — 'On the galitas in the Padapāṭha as a means of Ṛgvedic Interpretation, IA. Vol. III, Nos. 1 — 4, 1969

— 'Reappriasal of the Problem of the *galitas* in the *Ṛgvedapadapāṭha,' CASS Studies,* Number 1, *CASS,* University of Poona, Pune, 1978, pp. 31-54.

JOSHI S. D. and BHATE S. — *The Fundamentals of Anuvṛtti* CASS. University of Poona, Pune, 1984.

KARL H. POTTER — Biblography of Indian Philosophy, Motilal Banarasidass, New Delhi, 1970.

LAXMĪDHARA SŪRI — *Galitapradīpa,* Saṁvat 2016

NARAIN A. K. — *The Indo-Greeks,* IBH. Vol.I.

PALSULE G. B. — *The Sanskrit Dhātupāṭhas — A critical study,* University of Poona, Pune, 1961

PANDIT M. D. — *A Concordance of Vedic Compounds Interpreted by Veda,* CASS, University of Poona, Pune, 1989

— 'Formal and Non-Formal in Pāṇini,' *ABORI,* Pune, 1975

— 'Mathematical Representation of some Pāṇinian Sūtras,' JUP, 1967

— 'Pāṇini va Gaṇitaśāstra,' (Marathi), Shete Felicitation Volume, Pune, 1971.

— 'Some Linguistic Principles in Pāṇini's Grammar,' IL, 1963

— 'Statistical Picture of Pāṇinian Word-Formations,' ABORI, 1978.

PEANO — *Gruntlagen der Mathematik.*

PAŚUPATI NATH SHĀSTRI - *Ṛgvedaprātiśākhya,* Calcutta, 1927.

RADHAKRISHNAN S. — *History of Indian Philosophy,* Vol. I, 1929.

— *History of Philosophy, Eastern and Western,* George Allen and Unwin Ltd., London, 1952.

RAJA C. K. — *Samayānukramaṇī,* Madras, 1932.

RUSSELL BERTRAND — *Introduction to Mathematical Philosophy,* a Touchstone Book, Simon and Schuster, New York.

SERGIU AL GEORGE — 'The Semiosis of zero According to

Pāṇini,' *East and West,* Vol. 17, No. 1—2, Rome, 1967

STAAL J. F. — 'Euclid and Pāṇini, *Pholosophy East and West,* XV. 2, 1965

VAIDYA P. L. — *Madhyamaśāstra,* Buddhistic Sanskrit Text Series 10, Mithila Vidyāpeeṭha, Darbhanga, 1960.

WINTERNITZ M. — *History of Indian Literature,* Vols I & II.

Sanskrit Texts :

Mahābhyāṣya of Patañjali.

Kāśikā.

Siddhānta Kaumudī.

Paribhāsenduśekhara,

Tattvabodhinī, a commentary on BD'S *Siddhānta Kaumudī.*

Ṛgvedasaṁhitā.

Vājasaneyisaṁhitā.

Nyāyavārttika

Tattvacintāmaṇi.

Milindapañha.

Abberviations

The abbreviations which are easily decipherable to Sanskritists like RV = Ṛgveda, etc. are omitted from the present list. The following abbreviations are, however, to be noted :—

AĀ	— *Aitareya Āraṇyaka.*
AB	— *Aitareya Brāhmaṇa.*
ABORI	— Annals of the Bhandarkar Oriental Research Institute, Pune.
BD	— Bhaṭṭoji Dīkṣita.
BORI	— Bhandarkar Oriental Research Institute, Pune.
GB.	— *Gopatha Brāhmaṇa.*
HOS.	— Harvard Oriental Series.
IL	— *Indian Linguistics,* Pune.
IA	— *Indian Antiquary.*
JB	— *Jaiminīya Brāhmaṇa.*
JU	— *Jaiminīya Upaniṣad.*
JUB	— *Jaiminīya Upaniṣad Brāhmaṇa.*
JUP	— Journal of the University of Poona.
JMSUB	— Journal of the Maharaja Sayaji Rao

University of Baroda.

KS — *Kāṭhaka Saṁhitā.*

MS — *Maitrāyaṇī Saṁhitā.*

MSB — *Mādhyandina Śatapatha Brahmaṇa.*

SLA — *Studies in Linguistic Analysis,* Special volume of the Philological Society, Oxford, 1957

TA — *Taittirīya Āraṇyaka.*

TB — *Taittirīya Brāhmaṇa.*

TMB — *Tāṇḍya Mahā Brāhmaṇa.*